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Lighting and the Householder

First of a Series of Articles on Residential Lighting—Constructive Analyses of Various Aspects of This Oldest Field of Electric Lighting

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At the outset it will be stated that the so-called illuminating engineer has not the training and sensibility to extract the potentiality from lighting in the home. He has progressed well in industrial lighting and in various other fields in which engineering and pure utility are overwhelming factors, but by considering that such factors are dominant or even important in the home he has accomplished little in residence lighting. Coming into the home with his dominating ideas of engineering and efficiency he has unwittingly influenced the householder to assume an attitude toward lighting similar to that which he maintains towards such purely utilitarian features of the cost of living, such as fuel and food.

A little thought and the most superficial analysis reveal that cost and efficiency (in its narrow sense) in residence lighting are of little or no consequence in most rooms. If by a less stingy use of light the house becomes a home, the efficiency of lighting (in a broad sense) has increased. A few far-sighted individuals in the field of lighting have long been emphasizing the fact that the efficiency of lighting is determined by satisfactoriness and cost and not merely by the latter.

Light now costs about one-fiftieth as much as it did a century ago and most of this reduction has come during the last few decades. During the present century the cost has decreased so rapidly and the possibilities of lighting have increased so enormously that the consumer has not yet realized that we have emerged from the dark age. In fact, many illuminating engineers do not realize that the era of adequate and even luxurious lighting has arrived. Many of them and even central-station companies and other advertisers still hold before the consumer the idea of cost and efficiency instead of relegating these to the background in favor of lighting possibilities.

The average householder even in these strenuous days of the high cost of extravagant living obtains artificial light for *five cents per day* and a judicious and artistic use of light does not mean necessarily an increase in the operating cost. It means an adequate supply of outlets and controls a selection of lighting fixtures which are designed with definite aims, a number of portable lamps, and a judicious selection of adequate and proper equipment generally.

The scanty allowance for wiring and fixtures is a subject of general criticism in discussing residence lighting, but what has been done to educate the householder in the right direction? He cannot be expected to expand his budget unless he realizes that lighting is more than metal, glassware and lamps. He has not been taught that these are means to a greater end—lighting effect. He does not know that the lighting effects may help to make his house a home or that they may destroy the costly work of decoration and furnishing. He does not purchase paint and wallpaper as materials; he buys these for the effects which they produce. He has been taught to decorate and to furnish his home. He purchases fuel and burns it in an efficient heating plant, having in mind obtaining a comfortable temperature with the least cost. There is nothing more that he can obtain from fuel except by-products, such as ashes, which he would gladly do without. However, his attitude toward decoration and furnishing is different. He knows

Possibilities in Residential Lighting

Residence lighting was the mother of the electrical industry and, to continue the rhetorical figure, the parent has been neglected since its offspring attained the strength and confidence of youth. Other fields of lighting have had much time and energy expended systematically upon their development, but residence lighting has been permitted to drift helplessly.

The architect, the builder, the electrical contractor, the fixture dealer, the fixture designer, the decorator, and the central-station company come into contact with the householder, either directly or indirectly, but there is no organized effort on the part of these. In fact, residence lighting has been given little attention in any analytical manner by all concerned. The potentiality of lighting in this field has been grossly neglected and it is the aim of these articles to touch briefly upon various phases, presenting critical and constructive discussions.

that he obtains an intangible something from artistic surroundings besides the comfort of pure utility.

Let us invoice the householder's furnishings. He purchases a dining table for a hundred dollars or more. It has curved legs; it is of oak; it has been nicely finished. He could eat as comfortably (from a purely utilitarian point of view) from a table which costs only ten dollars. He needs no draperies at the windows and he could have purely utilitarian floor coverings for one-tenth of the cost of his rugs. In every room the pictures on the walls and other bric-a-brac, having no value from a purely utilitarian standpoint, cost more than the lighting fixtures and wiring; he spends much to hide the purely utilitarian walls. Continuing the invoice, it is readily seen that the average householder in furnishing his home spends ten times as much in an attempt to beautify his little kingdom as is necessary from a purely utilitarian point of view without considering so-called decoration. On every hand in the home there is overwhelming evidence to shame the illuminating engineer who makes the assertion that "this talk about esthetic lighting makes me tired."

Inexpensiveness of Light.

The inexpensiveness of light has not been presented to the householder in an effective manner. For years after the Mazda lamp appeared he was told through advertising that he could now get three times as much light for the same cost if he displaced the old carbon-filament lamp by the new metal-filament lamp. This advertising had some value, perhaps, in causing the householder to take advantage of the increased efficiency in light production by using greater intensities of illumination. But the fact that the new lamps were of greater candlepower or luminous output automatically led to greater intensities in the home.

For example, a 25-watt Mazda lamp emitted more light than the old "sixteen candlepower" carbon lamp. The advertiser in his effort to concentrate the householder's attention upon lamps failed to utilize his opportunity to emphasize the great possibilities of lighting effects. The householder whose attitude toward artificial light was inherited from the days of *mere* light considers it a necessary evil which has to be endured between sunset and bedtime. Three times as much of something that had never meant much to him certainly would not appeal to him even for the same cost.

The same criticism applies to the advertisers of other lighting accessories. Attention has been chiefly directed to fixtures as objects. Period, finish and efficiency have been emphasized and the householder's attention has been focused upon these objects instead of being directed to the lighting effects. Today most persons will look at the fixtures if asked to appraise a lighting effect. This is analogous to looking at the paint and wallpaper as objects instead of appraising the effect as a whole.

When talking to the householder about lighting, his attention often wanders to the meter. He knows that artificial light used to be costly and neither has he been allowed to forget it nor has he been taught that it is no longer true. He has not been shown that artificial lighting is the most potential agency in his house, considering cost. The advertiser has failed to analyze the tendency of the householder to be more liberal in attempting to beautify his home than in supplying purely utilitarian needs. After giving the matter some thought it becomes very obvious that the householder will willingly pay more for equipment plus an effect than for merely the objects which produce an effect that he has not been taught to demand, to obtain, or even to observe.

To return to the cost of light, let us take the case of a small decorative portable lamp. The average householder does not have many of these lamps today because he has *not been sold the outlets* necessary for conveniently connecting them. If he does have a small decorative portable he generally visualizes it as costing something to operate instead of appreciating the effect. Very likely a picture hangs upon the wall near it or a vase occupies a position on the piano, but the householder does not think of these as costing anything to "operate." Assuming that the picture cost $25, it is still costing the householder $1.50 each year that it hangs there, without considering depreciation. He forgets about the interest on this investment and does not realize that this $1.50 will keep his small decorative portable in operation as much as he would use it for the whole year. Furthermore, a lighted lamp has as much claim to being beautiful as other ornamental objects have. The interest upon the investment in bric-a-brac and pictures in the middle-class home usually amounts to several times the cost of artificial lighting.

Those who sell electricity and lighting accessories to the householder have not duly emphasized the potentiality of lighting and its meager cost for great pleasure which may be derived from lighting effects. The architect, the builder and the electrical contractor are also insufficiently acquainted with the possibilities of lighting to sell to the householder an adequate supply of circuits, switches and outlets. Fixtures must be designed with definite aims in order to extract the possibilities from lighting. The fixture dealer must demonstrate lighting effects and must light homes instead of selling mere objects. The electrical contractor must impress upon the householder the value of adequate wiring instead of blighting a house by installing only a few outlets. If he is an electrical dealer he will eventually desire to sell various electrical devices which must be connected to outlets.

Need for the Lighting Artist.

In this field of lighting there is an urgent need for the lighting artist. He could fill the need in this half of the field of lighting just as the engineer is doing in his field. Some might think that the artist who has designed fixtures is the logical and capable expert for this field. He or the decorator is the logical heir to this field of modern lighting, but that either generally appreciates the broad view of lighting at present is belied by their work. By expanding their breadth of vision pertaining to the functions and potentialities of light, they could readily become the lighting artists who

are so urgently needed today in the home and in other interiors. The artist who is at present in the field of lighting is generally as narrow in his way as the illuminating engineer is in his. But the former possesses the sensibility so essential for the field of esthetic lighting and if he will ballast himself with technical knowledge he will be the individual whom posterity will credit with the development of lighting as a fine art.

Light by being sprayed upon the walls and other areas of a room is just as capable of producing a certain effect or mood or impression as a similar use of pigments in paints and other wall coverings. Much of the charm of color may be obtained by lighting. In fact, the decorator depends upon light for his effects, but he does not seem to be aware of it. But the lighting artist deals with a more potential medium than the decorator possesses, for lighting is mobile. With adequate wiring the mood of a room may be entirely changed by touching a switch. Besides this great factor of mobility which introduces the desirable element of variety the lighting artist deals with primary light. The fixtures and other lighting "furniture" may be objects of living, pulsating beauty.

Perhaps it has occurred to some that purely utilitarian lighting has been unduly relegated to the background. In the kitchen and basement pure utility demands the use of engineering data and common sense. In the skeleton or foundation of the lighting systems in the other rooms, technical data and common sense should rule. The safeguarding of vision by adequate illumination intensities and by the absence of glare should be considered of prime importance. But the great possibilities of lighting throughout most of the rooms lies in the artistic or, more broadly, the psychological effects of light. Herein lies the potentiality of lighting and herein lies the key to overcoming the indifference of the householder toward lighting. Furthermore, purely utilitarian lighting is a by-product of artistic lighting and no satisfactory, harmonious, artistic effect is marred by glare. This bugaboo of the lighting engineer cannot exist in an artistic effect. To overcome glare it is usually only necessary to resort to simple expedients such as shading the lamps, selecting shades of proper depth or shape, and using diffusing lamps. That great results may be obtained by simple expedients is easily seen on every hand. A shower may be improved by exchanging the shades for deeper ones; a portable lamp may be improved by lowering the shade or by adding a dense fringe; or a glaring incandescent lamp may be improved by frosting its tip or by replacing it by a lamp with a diffusing bulb.

Problems of Residential Lighting.

These are glimpses of the problems underlying the development of the field of residential lighting. The householder is generally indifferent to lighting, but he is an interested student if aroused. This has been demonstarted many times in those cases where he has been shown the possibilities of lighting by actual demonstrations. Artificial lighting is easily sold to him in this manner and he indicates the same desire to use it to beautify his home as he does the more costly media such as decoration and furnishings. It is easy to convince him that beauty is not divorced from utility and that in a broad sense beauty possesses utility.

By broadening the functions of light in the home to include some of its extensive potentiality the attitude of the householder changes from one of indifference to one of keen enthusiasm. But to bring about this change those who come into contact with him must change their attitude toward lighting; they must develop their methods of presentation; they must alter their sales talks; the lighting artist must be developed. Lighting must be presented as a potential medium far superior to those of the decorator in bringing joy into the residence. Lighting effects must be demonstrated. Wiring, switches, outlets, fixtures, and electricty are merely means to an end. They exist between the meter and the eye and they should be adequate and harmoniously combined to produce lighting effects of the power, subtlety and mobility which are so effective in making a house a home.

The next article by Mr. Luckiesh will deal with the application of lighting effects as distinguished from lighting fixtures and will appear in an early issue.

SPECIAL LIBRARY ASSOCIATION TO TAKE CENSUS.

The Special Library Association is causing a census to be made of the special information sources of the United States such as is contained in libraries of banks, industrial concerns and similar institutions. Such a directory when compiled will be of great value to information specialists. In a letter sent out the following questions are asked:

(1) Name of institution or company.
(2) Name by which library is known.
(3) Name of librarian or custodian.
(4) Can it be classified as any of the following: financial; business; legal; engineering or technical; institutional; municipal; reference; agricultural?
(5) If not, how can it be classified?
(6) Does it serve a special clientele?
(7) Would your librarian be willing to assist other special libraries to a reasonable extent?

The above data should be sent to William F. Jacob, chairman, Library Census Committee, care General Electric Company, Schenectady, N. Y., who will be glad to answer any questions relating to the matter.

NAME OF CENTRAL-STATION COMPANY CHANGED.

The name of the Mahoning & Shenango Railway & Light Co., operating electric power and light and city and interurban railways in Mahoning and Trumbull counties, Ohio, and Lawrence, Mercer and Beaver counties, Pa., with main offices in Youngstown, Ohio, has been changed by the stockholders to the Pennsylvania-Ohio Electric Co. The change in name, it is announced, in no way affects the property, ownership or management, and has been made because the activities of the company have outgrown its old name and the new name is better descriptive of the territory served and services rendered.

Saratoga's Novel Lighting System

Resort City to Have Dual System to Give White-Way Illumination During Summer and Modified Illumination Remainder of Year

Famous as one of America's greatest watering places and as the scene of one of the gayest months of the horse-racing season, Saratoga Springs, N. Y., has long felt the need of adequate street and park illumination, but improvements have not been made because of the peculiar conditions which govern.

For one month in the year Saratoga Springs is the fashionable racing center, for three months it is an active summer resort and for the other eight months it is just a village. Thousands of people flock there in the summer to crowd the streets, hotels and places of amusement, and after the season the village returns to the normal condition of most any of 15,000 population. The streets are broad and well shaded, with side stretches of lawn between the sidewalk and curb, and there is an extensive park system involving Woodland park with an area of 1200 acres.

A unique system of street and park lighting, one that promises to attract considerable attention because of its distinctive features, has been proposed for Saratoga Springs. Last summer its Chamber of Commerce became interested in a plan to modernize the system. W. D'A. Ryan, director of the illuminating engineering laboratory of the General Electric Co., was asked to survey the situation and design a new system, one that would meet the unusual requirements.

Recommendations were made for one of the most distinctive and ornamental systems of its kind in the country. One set of lighting standards and one circuit will permit Saratoga to have a white way four months of the year, one that a fashionable summer resort requires, and an adequate and economical system the other eight months, as a village of its population might need. It also permits the white-way system to be dimmed at midnight and to operate at a less intensity from that time on until morning.

Dual System of Lighting.

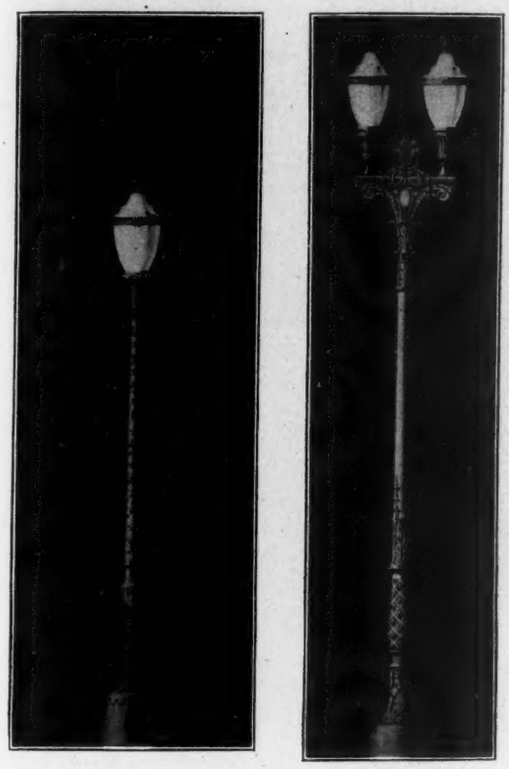
In the base of each lighting standard is a relay box. By short-circuiting the feeders at the power station, causing but a flicker in the illumination, the circuit is transferred by a movement in the relay box from lamps 1000-cp. intensity to lamps of but 250-cp. intensity, both sizes of incandescent lamps being installed within the same globe or fixture on each standard. To transfer the circuit back to the lamps of high intensity the circuit is again shorted momentarily and the relay switches the feeders to the larger lamps. This operation can be repeated as occasion demands.

Double-globe fixtures will be erected along Broadway, the principal thoroughfare. During the summer season, there will be 2,000 cp. supplied by each standard until the circuit is changed at midnight, when it will be reduced to 500 cp., the illumination that will also be supplied the

A View of How Broadway in Saratoga Springs, N. Y., Will Appear at Night After Its Proposed Street Lighting System Is Installed.

entire night the remaining months of the year.

The standards are located opposite each other and have spacings of approximately 135 ft. The height of the center of the light source is 20



Single and Double-Globe Lighting Standards Designed for New Street Lighting System in Saratoga Springs, N. Y.

ft. Approximately one mile of street will be lighted by 69 standards.

The installation will be financed by the Adirondack Electric Power Corp. at a cost of approximately $32,000. The city has entered into a ten-year contract with the electric company for this lighting at a yearly rate of $10,350.

Congress Spring park will also be lighted under the terms of the contract at an annual cost of $2,650. Fifty-three standards with fixtures similar in design to those installed on Broadway, but smaller, will be erected. Each globe will contain a 250-cp. series Mazda lamp. The installation cost will be about $10,000.

North Broadway, a residential extension of Broadway, will be lighted for a mile with the Broadway type of standard, excepting that one fixture will be used on each instead of two. Each globe will contain a 600-cp. series Mazda lamp.

Work on the installation will begin early this spring so that the system will be in readiness for use this summer.

EXPERIMENTS ON CARBON ARCS FOR SEARCHLIGHTS.

A series of experiments undertaken at the request of the British Admiralty was recently described before the Institution of Electrical Engineers in London. The object of the experiments was to develop the best method of testing carbons in order to prove their value for searchlights; to compare the relative qualities of existing carbons, other than flame carbons, for producing high-intensity searchlight beams, and to determine what improvement could be made either in the carbons themselves or in the methods of burning them.

At first it was proposed to make measurements of illumination at different parts of a searchlight beam under actual working conditions in the open, but the sources of error encountered were so great as to cause this method to be abandoned in favor of an indoor method of test, at any rate for the first series of experiments. In the laboratory the carbons were burned in an integrating photometer of cubical form, and simultaneous measurements were made of the average candlepower given by the arc and of the surface brightness of the positive crater.

By the method employed a comparison was made of 13 different types of carbon, both those already in use in the British and French services, and others specially prepared by an English firm. Experiments were made with two devices having for their object the control of the arc and its maintenance in a central part of the crater to ensure even burning of the carbons. One of these was an electromagnetic device, while the other depended upon a slow rotation of the positive carbon. For high current densities (0.3 ampere per sq. mm. and over) it was found necessary to copper both positive and negative carbons. It was found that while change of potential difference on the arc produced no definite detectable change of candlepower, an increase in arc length beyond a certain value produced a decrease both of crater brilliancy and of candlepower. It seemed likely that if allowance were made for the light obscured by the negative carbon, the shortening of the arc would be found to produce an increased average candlepower even at short arc lengths, but the exact amount of the obscuration was difficult to determine with accuracy. It was stated that in general it seemed to be clearly established that for any one carbon the candlepower increased linearly with the current, while the crater brilliance also showed a real increase, though its magnitude was not sufficient to determine the form of the relationship in this case. For the types of carbon considered, and apart from smoothness of running, there seemed to be no definite difference of any magnitude either in average candlepower or crater brilliancy for carbons of the same diameter run at the same current. The efficiency in candlepower per ampere increased, however, for the same current density as the diameter of the positive carbon was increased.

CHICAGO TELEPHONE EXPERTS DIFFER ON VALUATIONS.

Experts differ by $94,000,000 in revaluating the Chicago Telephone Company's property for rate making purposes before the Illinois Public Utility Commission. For the company, J. W. Alvord testified that the cost to produce the property at present prices would be $134,000,000. Attorney Jacob Ringer, for the city, said that the city's estimates of such a cost total $40,000,000.

New Lighting Sales Developments

Selling Lighting and Not Merely Lamps and Reflectors — Wider Appreciation of Value of Industrial Lighting—Progress in Other Lighting Lines

By W. E. UNDERWOOD

Publicity Department, National Lamp Works of General Electric Co., Cleveland, Ohio.

In the wake of practically every great invention minor inventions follow rapidly. Then comes a period of refinement upon the original inventions and the real job of marketing the product. We have seen these historic cycles in connection with incandescent lamps, automobiles, electrical appliances and scores of other inventions.

So, then, lighting developments during the past year and expectations for the present year lie not so much in new lamps or new lighting applications as in the development of existing lighting fields.

Industrial Lighting Now a Much Easier Product to Sell.

During the past year industrial lighting has assumed a new importance not only in the eyes of the electrical trade but in the eyes of industrial executives as well.

The theory that factory lighting has a vital bearing on production and the belief that most factories were not well lighted have been crystallized into fact, proved by extensive investigation.

The result is that the lighting salesman no longer needs to deal with generalities in selling better industrial illumination, because there are facts aplenty to prove his contention that an improvement in illumination inevitably means more and better factory output. And for the first time in lighting history he is permitted to sell on the right basis—not lamps and reflectors, but *better light*, or going even a step further, the wise lighting salesman is selling increased *production* and, having sold this idea, he will dispose of more reflectors and more lamps than ever he would, if his selling embraced nothing further then the mechanical means of obtaining better lighting, rather than the fundamental idea of improved illumination and the benefit which the factory manager may hope to derive from it.

Incidentally, the lighting industry, by presenting this new aspect of industrial illumination to factory executives, has aroused a deeper interest than has ever been previously evinced. One factory superintendent has stated the situation about as follows. "As long as you were urging me merely to buy lamps and lighting equipment, I remained in the somewhat passive attitude of defense that I have to adopt to preserve our profits from all going into the thousand and one things I am beseiged to buy every day. As soon, though, as you were able to show me definitely that I was putting a drag on the production in my plant through my failure to install better lighting—that is quite another story and I should be willing to spend a greal deal more than you ask, if necessary, to avoid this loss in production."

The necessary thing now for lighting people to realize and especially for the contractor-dealer, because in the majority of cases he is the man who is called upon to make lighting changes, is *more care in the installation*. Practically every new installation or regeneration of old installations calls for the use of high-candlepower light sources and for higher illumination intensities than were even dreamed of a few years ago. It is necessary as never before to guard against glare and this can be done easily by the man who thoroughly understands how to plan modern factory lighting and how to employ high-candlepower lamps with properly designed reflectors. The man who attempts modern industrial lighting installations without this vitally necessary knowledge is sure to find himself in no end of trouble. He hurts his own business and the lighting business as a whole.

Very fortunately the perfecting of the foot-candle meter, a small portable instrument for measuring illumination intensities, has been coincident with the quickened interest in industrial lighting. It is no more complicated than a thermometer and is as easy to read. Having convinced the superintendent or manager of a factory that good light is necessary to efficient production, the question naturally arises as to whether the illumination in the plant is good or bad. Very frequently the lighting is anything but good and the faults may be quite evident to the lighting expert. They are not so evident to the factory manager who, perhaps, has never even seen a really good installation of modern factory lighting equipment and is therefore incapable of judging by mere appearance whether his own plant is or is not properly lighted.

Foot-Candle Meter Eliminates Uncertainties in Industrial Lighting.

The foot-candle meter puts an end to such uncertainties. A few readings, which the factory executive may check for himself, will indicate the average illumination intensity and the published tables showing the lighting intensities which experience has proved advisable for various industrial operations will at once indicate whether the prevailing intensities as actually measured by the foot-candle meter are too low, which is most frequently the case.

Foot-candle meter readings also serve to show whether the illumination is uniform and even after a lighting renovation has been made, the foot-candle meter should be employed as a check to make certain that the desired intensity of illumination and distribution of light has been attained.

Central-station companies are becoming more

active in promoting better industrial lighting and in encouraging local contractors to specialize in this line of endeavor. Several central stations have employed industrial lighting experts to call upon the shops and factories to which power is supplied. These experts suggest lighting improvements which should be made and present a list of local contractors who specialize on factory lighting and are capable of making the necessary changes in equipment.

Other central-station companies are making permanent exhibits to show good factory lighting and its application. Several such exhibits contrast obsolete lighting installations with modern ones, thus giving the factory man a new basis for judging lighting.

The tendency is ever towards higher intensities and these come into practical use as rapidly as the mechanical means are perfected for obtaining more light without objectionable glare. So the electrical contractor in making a present-day installation should look somewhat into the future. He may safely assume that the installation which is considered good today will be obsolete in five years. He should figure a generous margin of current-carrying capacity for new lighting circuits, in the certain knowledge that the lamp wattage on these circuits will be constantly increased in the future.

Country Home Lighting Developing at a Rapid Rate.

Something more than 200,000 country home lighting plants are at present in use and the demand for such plants is so great that practically every manufacturer has planned on very material increases in production for the present year. This lighting field is so new and grows so fast that it is hard to realize its present size. Still it is quite within the realm of possibility that in the space of a very few years there may be as many wired homes in the country districts as in the larger cities. This progress is opening up a tremendous new market for lighting equipment and for electrical appliances of all sorts.

Big Field for Lamp Sales for Automobile Lighting.

Approximately seventy millions of automobile lamp bulbs were sold in this country during the past year, a demand ten times as large as it was five years ago, which gives an indication of the size of the field for automobile lighting equipment and an idea of the normal rate of growth of this field.

The production of Ford cars with 6 to 8-volt battery-generator starting and lighting systems opens up a new field for the sales of Ford electrical accessories. This change is also affecting lamp demand through decreased calls for 9-volt lamps to be used on the older cars equipped with magneto lighting systems and through increased demand for 6-8-volt lamps for the newer cars. It will not be long until the demand for 9-volt lamps practically ceases, making it possible for the lamp distributor to handle all car-lighting demands from a smaller, less diversified lamp stock.

Spotlights, trouble lamps and headlight lenses are constantly becoming more popular and many cars are now being initially equipped by manufacturers with these accessories.

The advent of the new straight-side or S-11 bulb headlight and spotlight lamp, placed on the market on Jan. 1, 1920, by most lamp manufacturers, marks an improvement in automobile lighting as the new lamp has a firmer base, stronger bulb, better filament alinement and is better adapted to focusing reflectors than the round-bulb lamp. These new lamps will rapidly replace the older round-bulb lamps and eventually the lamp manufacturers will no longer regularly make round-bulb headlight and spotlight lamps.

The most crying need at present in regard to automobile lighting is for more uniform state and city laws. At present car lighting that is entirely permissable in one state or community is not at all within the law in an adjoining state or city. The situation is confusing and irksome to the car owner, the supply dealer and the manufacturer.

Better Diffusion of Light Now Possible.

Much progress has been made during the past year in the avoidance of glare through better diffusion of light.

The new white Mazda 50-watt gas-filled lamp is made in a milky white glass bulb. The opalescent appearance of the lighted lamp is decidedly pleasing and the coloring is sufficiently dense so that, even when lighted, the filament is not visible through the glass. The absorption of light by the glass is relatively small so that the light lost in this way is not a great item.

Prior to the advent of this new lamp, the gas-filled lamps were not generally suited to use in the home because of the extreme brightness of the concentrated styles of filament. By obviating this objection, the new white Mazda lamp is especially suited for home use.

There has been an increasing demand for opal glass or mirrored metal caps for gas-filled lamps when employed in dome type metal reflectors as usually employed for factory lighting. Better illumination has resulted and further development to incorporate this principle in more simplified form may be expected.

Another new development in connection with the metal reflector and the direct method of lighting aims to throw more light on the ceiling and upper walls, so as to avoid the sharp contrast between the well lighted working plane and dim ceiling and upper walls, which contrast becomes more and more marked with the growing tendency towards higher illumination intensities on the working plane. Several innovations in reflector manufacture have been introduced to accomplish this object, the most notable of which is probably the new glass-top metal reflector recently placed on the market.

Color as Related to Illumination.

As a further lighting refinement, the consideration of color is certain to bring new developments.

So far, the only wide application of color in lighting is represented first, by the Mazda daylight lamp for which there is a large demand primarily for store and store-window lighting and for certain industries; and second, by color-

matching units which are also in extensive use in stores and industries.

The decorative effects of colored lighting for the home, the psychological or physical effect of color in illumination for certain industries and the thousand and one other possibilities of color control in lighting are, as yet, matters largely for the scientific experimenter but they will undoubtedly find practical lighting applications in the future.

LOS ANGELES PLANS COSTLY POWER PLANT INSTALLATION.

City Will Place Hydraulic and Electrical Machinery at San Fernando Plant and Generating Units at Franklin Canyon Station.

Plans and specifications for hydraulic and electrical machinery and equipment required for the complete installation of Los Angeles, Cal., proposed San Fernando power plant and for the installation of one of the two main generating plants at the Franklin canyon plant have been submitted to the Common Council by the Los Angeles Department of Public Service.

Chief Electrical Engineer E. F. Scattergood states that the net profit or surplus earning resulting from the installation of these plants, after allowing for operating expenses, maintenance, interest and sinking fund, would be in excess of $250,000 per annum as against the purchase of the corresponding amount of power at 1 cent per kw-hr., or a net benefit in excess of 25% of the total cost of installing the plants. In his statement he says:

"I have prepared and, with the exception of a few technical paragraphs, have ready for presentation for consideration of the Board, specifications for hydraulic and electrical machinery and equipment required for the complete installation of the city's proposed San Fernando power plant and for the installation of one out of two main generating units at the city's proposed Franklin canyon power plant.

"The probable cost, including freight, of the machinery and equipment so specified for the San Fernando power plant is estimated to be $180,000 and for the Franklin canyon plant $60,000.

"The total cost of the complete installation of the San Fernando plant at present prices of labor and equipment is estimated to be $725,000 and the time required for completion about ten months from the date of letting of contracts. The estimated cost of the partial installation at Franklin canyon, assuming the erection of a permanent building large enough for housing the additional unit when installed later, and including $30,000 for the erection of an additional transmission circuit from Franklin canyon to connect with the 33,000-volt lines in the city, is $200,000, and the time required for completion after letting of contracts will be from nine to ten months.

"The capacity of the San Fernando plant will be sufficient to utilize the full flow of the aqueduct, but, assuming the first year of its operation an average flow through the plant of 250 second-ft., there would be delivered in the city approximately 2,600,000 kw-hrs. per month which, valued at $0.0065 per kw-hr., would represent a gross earning of $203,000. The additional expense for operation and maintenance of the city's generating system on account of the San Fernando plant, together with interest and sinking fund allowances on $725,000, would equal approximately $78,000, leaving a balance or surplus earning resulting from the installation and operation of the plant as against allowing the power site to remain unused, of $125,000 per year.

"The partial installation at Franklin canyon plant, assuming an average flow of 50 second-ft. through it, would deliver into the city's distributing system approximately 550,000 kw-hrs. per month, or 6,600,000 kw-hrs. per year. This energy, valued at $0.007 per kw-hr., on account of its different load-factor conditions from the San Fernando plant energy, would yield a gross earning of $46,200 which, after deducting allowances for operation and maintenance, together with interest and sinking fund on the investment of $200,000, would leave a balance or surplus of $21,000 per year.

"Estimates of probable requirements of electrical energy for furnishing the consumers attached to the city's distributing system, together with the consumers within the city attached to the Edison company's system, indicate that approximately the total output of these plants will be needed from the beginning of the year 1921 and that without them, in event of the taking over of the Edison system by the city, it would be necessary for us to purchase an amount of power approximating the output of these plants at a cost per kw-hr. very considerably in excess of the above rates of $0.0065 and $0.007."

DRY-CELL VOLTAGE AND HYDROGEN-ION CONCENTRATION.

United States Department of Commerce, Bureau of Standards, has issued scientific paper No. 364 on "Relation of Voltage of Dry Cells to Hydrogen-Ion Concentration," by H. D. Holler and L. M. Ritchie. The paper tells that the potentials of electrodes consisting of Acheson graphite and certain manganese ores was found to be a logarithmic function of the hydrogen-ion concentration of the solution in contact with the electrode, while that of electrodes containing a chemically prepared oxide of manganese is independent of hydrogen-ion concentration. The relation between the potential of the manganese dioxide electrode and hydrogen-ion concentration explains variations in open-curcuit voltages of dry cells and accounts for the polarization of a dry cell on discharge. Those interested can obtain copies of the paper by writing to the Bureau of Standards, Department of Commerce, Washington, D. C.

AVERAGE WAGE INCREASE WOULD BE SMALL.

According to Prof. Robert Andrews Millikan, director of physical research, California Institute of Technology, if the incomes of all employes in the telephone and steel industries were averaged, the average income of the wage earners would not be increased more than 2 or 3%.

Hump Method for Treating Steel

Electric Furnace Used with Curve-Drawing Potentiometer Pyrometer Forms the Basis of Improved Method for Heat Treatment of Steel

A new method for the heat treatment of steel has recently been introduced which promises to revolutionize hardening-room procedure and results. The purpose of heat-treating processes is to impart certain qualities of hardness, toughness, tensile strength and grain structure to the material. This should be reliably accomplished without change in size or shape, without scaling or decarbonization, without waste of material by faulty treatment and with the least possible expense for labor and supervision. In all of these respects the new method, known as the "hump method," exerts a favorable influence upon hardening-room practice.

The hump method utilizes the outward manifestation of changes in internal structure, which takes place when steel is heated past the so-called critical or transformation point, to indicate when the work should be withdrawn from the furnace. In using this method, the temperature of the furnace, and therefore of the work, is raised at a uniform rate until the transformation point of the steel is reached. At this time there is a marked decrease in the rate of temperature rise. This change in the rate of rise is made plainly visible by an autographic recorder connected to a thermocouple placed close to or in contact with the work. The effect is clearly shown by a bend or hump in the curve as at *C*, Fig. 1.

This hump corresponds to a pause in temperature rise or decrease in rate of heating of the steel, which occurs in spite of the fact that heat is being transferred to the work during this interval as rapidly as before or after. It is explained by metallurgists as being due to the dissolving of cementite, or carbide of iron, in the pure iron, or ferrite, and to other chemical and physical changes depending upon the composition of the steel. By microscopical and chemical means, it is known that the physical and chemical structure of steel after quenching is profoundly influenced by the relative time of quenching with respect to the time at which the arrest occurs. The hardness, strength, ductility and toughness are all definitely influenced.

As a guide in hardening, the temperature pause, or decalescence point, as it is called, is much more reliable than is the furnace temperature as indicated by a pyrometer. The arrest in temperature signaled by the hump or bend in the line drawn by the pyrometer pen shows that the internal changes, so momentous as affecting the qualities of the finished steel, are actually taking place, and, once the proper interval to be allowed after the hump before quenching has been determined, there is no uncertainty about the results of hardening.

Description of Electric Furnace.

Uniform, standardized conditions and a control of the rate of heating the work are essential to the hump method of heat treatment. A small furnace for heat-treating tools, dies, etc., is shown in Fig. 2. The heating element consists of a vertical, cylindrical resistor, surrounded by insulating material in a sheet-iron jacket. The resistor rests upon a refractory block, which is supported by a cast-iron bottom plate. The heating chamber is closed at the top by a refractory cover, while a cast-iron top plate confines the loose insulating material, filling the space between resistor and jacket. An iron-constantin thermocouple of bare No. 8 gauge wire projects upward from the center of the bottom refractory block.

By means of a small wire attached to a tool support on the top plate of the furnace, the work to be treated can be suspended in close proximity to, or touching, the end of the thermocouple. In production furnaces other methods of supporting the work are used. For example,

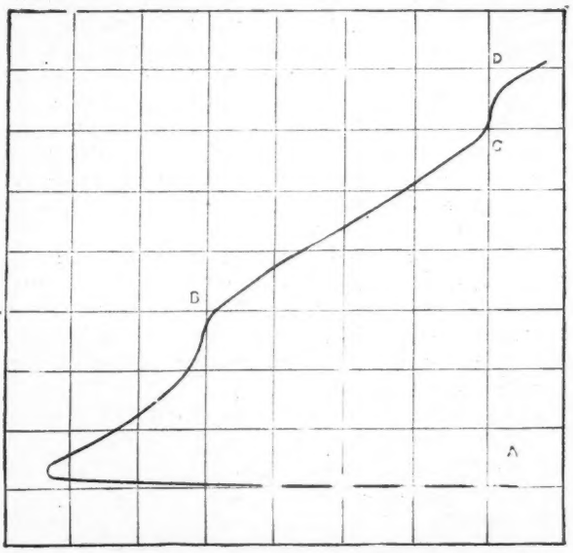


Fig. 1.—Chart From a Curve-Drawing Pyrometer, Showing Hump C-D, Due to Passing of Steel Through the Transformation Point.

in the furnace shown in Fig. 3, designed for heat-treatment of automobile transmission gears, the work is placed upon holders before insertion in the furnace. Covers placed on the furnace completely close the heating chamber, preventing renewal of the atmosphere, and the work is thus protected against oxidation and scaling.

Method of Operation.

At the moment when the work is introduced into the furnace, the temperature of the latter is, say, 1400 deg. F., but the heat-storage capacity of the furnace walls being small, compared with that of the charge, the temperatures of both thermocouple and furnace walls drop rapidly a few hundred degrees, the current through the heating element or resistor being shut off during this time. The result can be seen in the chart made by a curve-drawing pyrometer connected

to a thermocouple located in a furnace operated in the manner just described, as reproduced in Fig. 1. The temperature drops rapidly from 1400 deg. F. at *A* to about 870 deg. F., and then rises slowly to *B*, where it is stationary, the thermocouple, furnace walls and all parts, small and large, of the charge having reached approximately the same temperature. The switch is then closed, the input being so regulated that the temperature rises at the desired rate. The fact that the work and furnace start from the same temperature at *B*, far below the critical point, coupled with a proper arrangement of the heating element with respect to the charge, insures that all parts of the work will go through the critical point at the same time. This is desirable in order to avoid stresses and distortion that would follow from unequal expansion or contraction if different parts of the work passed through the transformation point at different times.

The arrival of the work at the transformation point (*C*) causes an abrupt change in the rate of heating, due to the suddenly increased capacity of the steel to store heat, the temperature stops rising or proceeds much more slowly than before, although the rate of supply of heat energy has not been changed. However, once the transformation is completed, as at *D*, the temperature again rises rapidly. The pause is plainly shown by the hump in the curve.

Before quenching, it is necessary to heat the work for a certain time after this point, the time

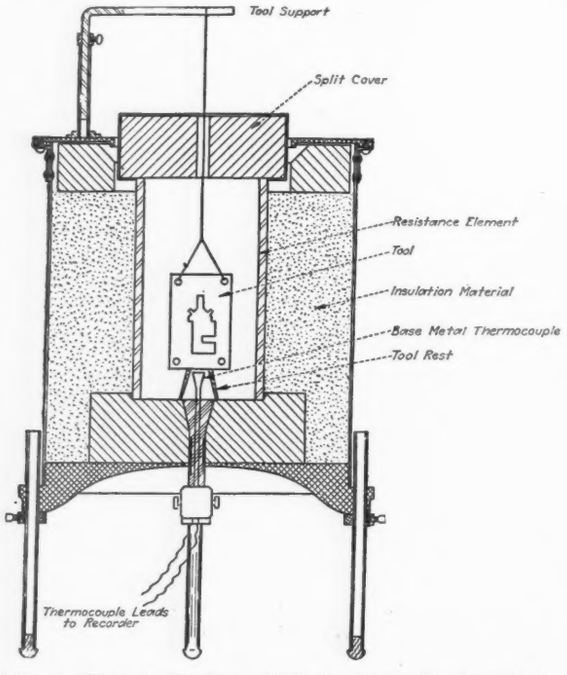


Fig. 2.—Electric Furnace Used for Heat Treatment of Tools, Dies, Etc., by the Hump Method.

depending on the mass and shape of the steel, the quenching medium employed and the qualities desired. The exact further heating to be allowed after the completion of the transformation point is learned by experience or trial, but, once known, all uncertainty as to the result is practically eliminated.

In using the hump method, the metal is quenched without hesitation, as soon as the pen has gone the prescribed distance past the "hump" which indicates the transformation point. Errors due to inaccuracy of pyrometers, non-uniform temperature in the furnace, failure of the work to reach the furnace temperature, or incorrect information regarding the transformation temperature, are avoided, and the steel is not injured

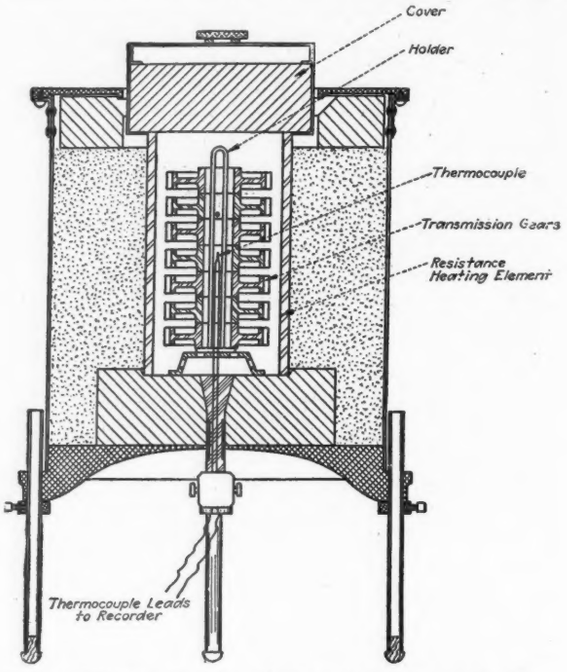


Fig. 3.—Electric Furnace Used in the Commercial Production of Automobile Gears by the Hump Method.

by overheating or by holding it at a high temperature for too long a time. Each piece of work carried the same distance beyond the reference point *C* or *D* will show the same internal structure. This is true whether or not the temperature represented at the point *C* on the chart is correct, and whether or not it is the actual temperature of the steel at that moment. The important fact is that the chart tells the attendant when the steel is going through the transformation, from which he may know that quenching after a certain interval will secure the desired physical qualities. Furthermore, the chart remains as a record of just how each individual lot of steel was treated, and can be referred to in connection with properties developed in physical tests of that steel.

It is found that the rate of temperature increase has a marked influence upon the properties exhibited by the steel after quenching. The resistance furnace is admirably adapted for controlling the rate of temperature rise, since the rate of energy input is easily regulated by reference to an ammeter supplied as part of the furnace equipment. The potentiometer pyrometer is likewise peculiarly suited for carrying out the hump method of heat treatment, as it is sensitive to small changes in thermocouple e.m.f., and exhibits changes in rate of temperature rise upon a magnified scale. It is, in fact, the only form of pyrometer having these qualities in the desired degree.

As an example of the use of the electric furnace in hardening tools, the manner in which punches and dies are produced in a shop where

this method has been used exclusively for the past six years will be described. One of these punches and dies is shown in Fig. 4. The punch is first made in the ordinary way by machining and hand finishing. It is comparatively easy to secure accuracy in the making of a punch, as all measuring, gaging, etc., is done on the outside. The die is made to approximately the correct size, but slightly smaller. The punch, having been hardened and ground to exact dimensions, is then used as a broach to cut the die. It is forced into the die a short distance, raising a burr, which is removed by filing, the operation being repeated until the cut is finished. The die is then relieved, but no further work is done on the cutting edge. After hardening the die by the hump method, the size and shape are found to be exact with respect to the punch, so that subsequent work, as stoning or grinding, is not required.

Dies which have been broached by the punch and then hardened by the hump method, are superior, for purposes where close correspondence of punch and die are necessary, to hand-made dies hardened in the ordinary manner. Hand-made dies must be corrected by hand work after hardening, and such hand work can be guided only by reference to a templet. It is practically impossible to make the templet exactly the same shape as the punch, and it is also difficult to make the die fit the templet exactly. Even on work where internal calipers or micrometers can be used, it is not practicable to make a die exactly the same shape and size as the punch, as any hand work is necessarily more or less irregular.

The fact that dies hardened by the hump method fit exactly with the punches by which they are broached shows that there has been volume change or distortion during the process of hardening. It has been found, however, that the previous history of the material, the rate of heating and the interval which is allowed to elapse between the transformation point and

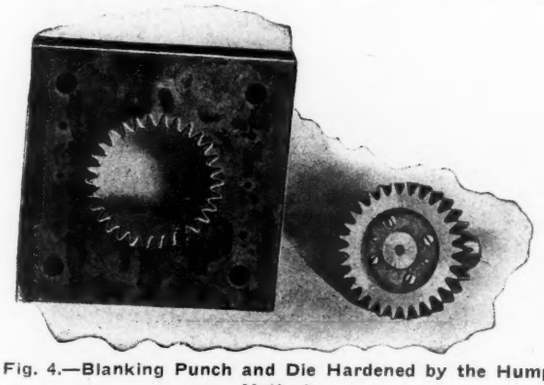


Fig. 4.—Blanking Punch and Die Hardened by the Hump Method.

the quenching point has certain relations to volume changes which are of great importance in the hardening of such objects as dies, milling cutters, gears, etc.

Comparison of Results With Electric and Gas Furnaces.

Comparisons made in the instrument shops of the Frankford Arsenal of taps hardened in an electric furnace by the hump method with taps hardened in a gas furnace indicate that superior physical qualities, as shown by increased life, are obtained by the hump method. The gas furnace was of the partial muffle type, burning illuminating gas. The electric furnace was, after brief instructions, operated by the same man who had been hardeing taps in the gas furnaee for several years. The following is a summary of the results:

	New	1st regrind	2d regrind	3rd regrind	Total	Increase in life
BRAND A.						
Average (7) gas treated	29	204	86	65	384	
Average (2) electric treated	100	270	33	103	506	32%
BRAND B.						
Average (7) gas treated	84	151	25	36	296	
Average (2) electric treated	7	384	26	20	437	48%
BRAND C.						
Average (9) gas treated	94	210	207	9	520	
Average (8) electric treated	414	232	129	8	782	50%
BRAND D.						
Average (7) gas treated	131	243	340	71	792	
Average (2) electric treated	520	107	350	10	987	25%

The taps were 1.504 in. in diameter, had 12 threads per in., and were used in tapping fuse holes in 3-in. steel projectiles. Tests were made on taps from four different brands of steel. The figures in the table represent the number of holes tapped after each grinding.

With each brand of steel, therefore, taps hardened in the electric furnace showed a greatly increased life over those hardened in the gas furnace.

Except with Brand B, the average is very marked before the first regrind. The fact that these taps averaged 384 holes after the first regrind indicates that the fault is not in the hardening, but in some unavoidable feature in the grinding, or in the use of the taps. The outer case of the taps should be the hardest, and if the tap is held to shape in hardening more of its hard surface remains for use. This would probably be the case in the electric furnace and might account for the greater life before the first regrind. Then again, there is more decarbonization in the gas furnace, and this would cause the surface to be composed of low carbon steel, which would not be good for cutting purposes. The life of a tap would naturally be expected to decrease gradually as in Brand C (electrically treated). In the electric furnace the work is heated in a neutral atmosphere, and emerges practically as clean after hardening as before it was placed in the furnace, saving considerable in time and expense for finishing.

Electric Furnace Simplifies Production.

Production operations are greatly simplified by the use of electric heat-treating furnaces with the hump method. As an example refer to Fig. 5. Formerly in this plant automobile transmission gears were heated for hardening in lead pots located in the basement beneath the machine shop. After the gears had been machined, they were removed on trucks to an elevator, lowered to the heat-treating room, an uncomfortable place because of heat and fumes, and wheeled to the lead pots. The gears were placed in the lead pots in batches, and, when they had come up to tempera-

ture, were lifted out one at a time, and dropped into the oil quenching bath. The time of heating in the lead pots was thus not the same for all pieces, and the temperature also varied with the location in the pot, possibly resulting in non-uniform hardness and grain structure. The gears were also sometimes injured by dropping upon one another in the quenching tank. The drawing was done in gas furnaces, followed by an oil quench. Upon their return to the machine shop the gears were wire-brushed to remove adhering lead.

The electric furnace equipment replacing the lead pots and gas furnace is located in the machine shop itself. There are six electric hardening furnaces located on two sides about a quenching tank, with three electric annealing furnaces on the remaining side, also a drain grid and the cleansing bath between the quenching

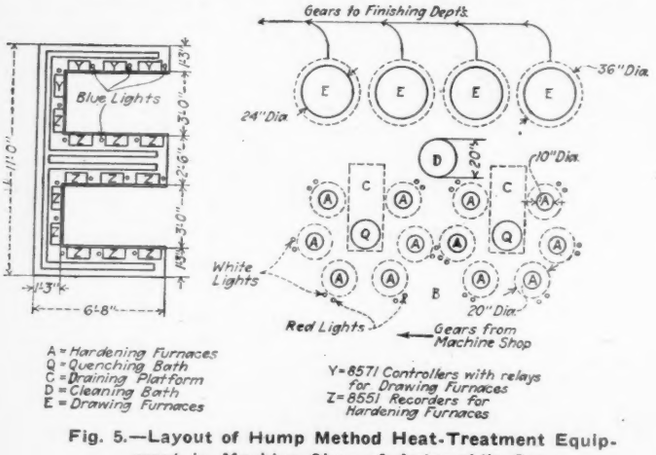


Fig. 5.—Layout of Hump Method Heat-Treatment Equipment in Machine Shop of Automobile-Gear Manufacturer.

tank and the annealing furnaces. The tops of all furnaces and tanks are flush with an elevated platform. The work is brought on trucks to the edge of the platform, where a boy arranges the gears upon holders, which are easily picked up by the operator, and upon which the gears remain until they have passed in turn through hardening furnace, quenching tank, cleansing bath and drawing furnace. Corresponding to each hardening furnace, there is a curve-drawing recorder, and for each drawing furnace an automatic temperature recording controller, all mounted upon a wall nearby, where also are the furnace rheostats. An assistant foreman on duty at this point directs the operations according to the indications of the curve-drawing recorders connected to the hardening furnaces.

Electric Furnace Effects Savings.

The amount of electrical energy consumed by the electric furnace is comparatively little, due to the efficient insulation. There is no loss of heat in waste gases, as with combustion furnaces, leaving to be supplied only the heat imparted to the work. The higher cost of electrical energy is more than offset by the saving in necessary apparatus, such as pumps, blowers, burners, etc., and the labor costs, as the electric furnace can be located in the machine shop in the direct line of manufacture, thus saving the double handling of the work which is necessary where the latter must be taken from the machine shop to a hardening room and then back again.

The use of the hump method in regular manufacturing is claimed to result in a higher grade and more uniform output, and simplify handling and cleaning to such an extent as to render the cost of electrical energy of minor importance. Dependable results and large volume of output are obtained with regularity and certainty, and without requiring a large number of skilled men.

Where electric furnaces are used in the tool room, the toolmaker can be closely in contact with the hardener, so that methods of operation in tool making, which often increase the difficulties of the hardener, can be avoided, while through the use of the hump method it is sometimes possible to simplify the work of the toolmaker as related in connection with the making of dies.

The hump method of heat treatment is controlled by the Leeds & Northrup Co., of Philadelphia, which company also manufactures the electric furnaces and curve-drawing pyrometers used in carrying out the process.

DOMESTIC REFRIGERATORS AS A CENTRAL-STATION LOAD.

Comparison with Other Appliances as a Revenue Producer—Mechanical Principles, Sales Possibilities and Advantages.

By Robert Montgomery.

Manager, Commercial Department, Louisville (Ky.) Gas & Electric Co.

It is the usual custom to compare the annual revenue produced by different domestic appliances, the one producing the largest revenue being considered the most desirable by the light and power company and the one most worthy of exploitation.

The most desirable power customer is the one paying the largest amount per year per kilowatt of demand, and invariably more money and effort is spent to secure the power business having a high load-factor. Such power business as produces an annual revenue amounting to less than $12 per kilowatt of demand is not considered very desirable; in fact, many light and power companies require a customer to pay a minimum monthly bill amounting to as much as $16 per kilowatt of connected load per year. Perhaps if we would analyze electric household appliances along these lines we could decide more intelligently which ones are most desirable to exploit. Aside from the revenue per kilowatt of demand per year produced by an appliance, we must, of course, consider the time of day and season of the year that the appliance is used, Fans, washing machines, irons, vacuum cleaners, toasters and grills, as a rule, constitute off-peak business, contributing neither to the daily peak of the individual customer nor to the power station's winter peak.

The electric range, refrigerating machine, percolator, and possibly the radiator, operate during the daily peak of winter months, contributing both to the peak load of the individual customer and the station. In the case of the electric range, the light and power company must, as a rule, spend more than $100 for in-

creasing the capacity of meter, service wires and transformer before service can be furnished, while all of the other appliances I have mentioned require no additional investment of this character on the part of the company. The washing machine, which, in itself, constitutes one of the poorest producers of revenue, indirectly, causes a very appreciable increase in the customer's revenue. Experience has shown that an electric washing machine insures the weekly washing being done at home, and, as a result, the electric iron will be taken down from the shelf and put to work, thereafter producing a revenue of $12 per year, whereas, without the washing machine in the house, and the laundry done away from home, it produces practically no revenue.

ANNUAL REVENUE PER KILOWATT OF DEMAND FOR VARIOUS ELECTRIC APPLIANCES.

Appliance.	Maximum demand in watts.	Annual kw-hr. consumption.	Equivalent hrs. use of demand.	Rate.	Annual revenue.	Annual revenue per kw. of demand.
Washer	300	20	66	$0.084	$1.68	$5.60
Grill	500	34	68	.084	2.85	5.70
Toaster	500	37.5	75	.084	3.15	6.30
Range 5,000	1,500	300	.0325	48.75	9.75
Iron	575	67	116	.084	5.62	9.79
Percolator	400	42	105	.084	4.03	10.07
Cleaner	170	25	147	.084	2.10	12.35
Radiator	600	96	160	.084	8.06	13.43
Fan	40	31	775	.084	2.60	65.00
Refrigeration ..	300	864	2,880	.0325	28.08	93.60

(Note.—The average lighting rate throughout the United States is assumed to be $0.084, and the average cooking rate $0.0325. The refrigerating machine, owing to its high load-factor, is assumed to earn the same rate as the range. The annual kw-hr. consumption of the appliances (except refrigeration), was obtained from data collected by the Society for Electrical Development. The consumption shown for refrigeration was obtained from experience of a refrigeration machine manufacturer in a northern city.)

It is apparent from the above data that the domestic refrigerating machine produces more revenue per kilowatt of demand than any domestic appliance served by a light and power company. Therefore, it is worth our while to determine just how practical domestic refrigeration is and how many of customers can afford to make the investment necessary to have one of these machines installed in the home.

Mechanical Principles of the Domestic Refrigerating Machine.

In a large cold-storage plant the refrigerating machines are operated by a skilled engineer who must be on hand to start and stop the machines as the necessity may arise. He must watch the pressure gauges, regulate the expansion valves, attend to the oiling and give the equipment constant attention. Therefore, when mechanical genius attempted to construct a miniature refrigerating plant for use in the home, it was realized that such a machine must be strictly automatic and foolproof and designed to operate without any attention whatever, except occasional oiling. For years they have experimented with domestic refrigeration, each year making more improvements, and today we find several manufacturers offering machines on a positive guarantee that they will operate satisfactorily.

In large refrigerating machines liquid ammo-

Electric Lighting in Chicago's "Rialto" at Mid-Day

Here is an example of the part illumination plays in modern life. Feb. 6 last was an unusally dark day in Chicago, the kind that the ancients used to think forecasted the end of the world. We are beyond that stage now, and merchants in Randolph street simply turned a few switches and went on about their business, with the result that the above looks more like a night than a day scene.

nia, or liquid carbon dioxide, which operate under very high condensing pressures, is used as the refrigerating agent. The normal condensing pressure for ammonia is between 175 and 200 lbs. per sq. in., and for carbon dioxide between 800 and 1000 lbs. per sq. in. Such high pressures as these proved impractical for the small domestic machines, and therefore sulphur dioxide is used, which rarely exceeds a pressure of 75 lbs. per sq. in. in the condenser, and usually condenses at a much lower pressure.

The domestic refrigerating machine is designed to maintain the average household ice-box or refrigerator at a much lower temperature than can be obtained with ice, and, at the same time, keep the air in the refrigerator at a uniform temperature and dry.

These machines are so designed that they can be installed in any standard type of ice-box, making it unnecessary to purchase a new box. A brine tank (and with some makes of machines a copper coil) is placed in the ice-box, in the compartment which is ordinarily filled with ice. One manufacturer furnishes three different sizes of brine tanks for boxes having capacities of 20, 30 and 40 cu. ft. This brine tank is filled with a solution of calcium chloride, in which expansion coils are immersed, and each brine tank is provided with a small ice-making chamber in which small cubes of ice are made in sufficient quantity for table use.

Method of Operation.

The compressor is driven by a ¼-hp., 110-220 volt repulsion type motor, the normal demand of which is 300 watts. This compressor, together with the condenser, is usually placed in the basement and connected with the brine tank by means of copper tubing. A thermostat automatically controls the motor, causing it to start and stop, according to the temperature existing in the ice-box.

When the action of the thermosstat stsops the motor, the temperature must rise about 4 deg. before the thermostat again starts the motor; therefore, the temperature of the ice-box does not vary more than 4 or 5 deg. F.

The temperature of the brine in the tank is always between 20 and 25 deg. F. and the air which is constantly circulating inside of the ice-box is not only reduced in temperature by contact with the cold brine tank, but is actually dried by depositing its moisture on the brine tank in the form of frost. (In demonstrating the machine the salesman usually keeps matches and a small can of table salt in the ice-box in order to convince the customer of the dryness of the air.)

The number of hours that the machine is in actual operation during each twenty-four is governed, of course, by the size of the ice-box, the quality and condition of the box, the room temperature and how often the doors of the box are opened. Under average conditions, the machine will operate about one-third of the time, or eight hours out of twenty-four.

We have a machine in our model kitchen which has been in operation since Oct. 1, 1919. The machine has a capacity of 30 cu. ft. and is being operated in connection with a refrigerator having a capacity of 17 cu. ft. This oversize machine was installed for the reason that the doors of the refrigerator are opened and closed continuously all day, on account of frequent demonstrations. This machine has operated continuously since Oct. 1 and has required no adjustments whatever, nor any attention other than an occasional oiling. Since the machine was installed it has consumed an average of 100 kw-hr. per month.

Marketing Refrigerating Machines.

The success of domestic refrigeration depends to a large extent upon the service that will be rendered by the firm retailing the machine. In the course of time something is certain to go wrong and if there is no service man available to respond promptly to complaints, the machines will certainly not prove popular.

The best prospects are, of course, the wealthy class of people and rural customers located where it is inconvenient to procure ice; small restaurants, small grocers and other commercial houses having refrigerators with a capacity of 40 cu. ft. or less are also excellent prospects. The number of prospects in the city for domestic refrigeration is limited only by the number of families able to make the investment.

Retail Prices.

Different makes of machines are sold at varying prices and, due to the increased cost of labor and material, most of the manufacturers have recently advanced their prices. The following represents the retail prices quoted by one manufacturer, which I present merely to give some idea as to the approximate investment that it is necessary for a customer to make: No. 1, 20 cu. ft. capacity, $350; No. 2, 30 cu. ft. capacity, $400; No. 3, 40 cu. ft., $450. The capacity in cubic feet indicates the maximum size of the ice-box the machine will take care of. An additional charge is made covering labor and material necessary for the installation, which ranges from $10 up, depending upon conditions.

Cost of Operation.

The energy requirements of the ¼-hp. motor which drives the compressor amounts to about 300 watts on an average. The average machine will operate about one-third of the time, or 240 hours per month; thus, the monthly current consumption of the average machine will amount to approximately 72 kw-hrs.

In Louisville the standard lighting rate is 8 cents, less 5% for prompt payment, but a special rate, known as the "excess 3-cent rate," is available to customers applying especially for it. Under the terms of this rate, the standard lighting rate of 7.6 cents (net) is charged for the first 6 kw-hrs. per room per month, and all excess consumption is billed at 3 cents (net). When rating a customer's house the following rooms are not counted: Bathrooms, toilets, small halls, porches, closets, basements, garrets, butler's pantries, sleeping porches, laundries, storage rooms, etc.

Both the electric range and the refrigerating machine may be operated at a cost of 3 cents per kw-hr.; on this basis, the refrigerating machine would produce an average monthly revenue of $2.16.

EDITORIAL COMMENT

Lighting Opportunities for the Contractor-Dealer

Many indications in the last six or so months point to a very marked stimulus to the interest in lighting on the part of the public in general. The war restrictions on lighting and the temporary restrictions during the coal strike of last November and December showed that lighting could be curtailed only at great inconvenience to practically all and at danger and loss to a great many. Storekeepers especially noticed loss to business from darkened signs and show windows. The productive value of modern factory lighting was clearly demonstrated in the war industries and last year was conclusively verified in peace-time industries by tests whose results have been widely disseminated and impressed on industrial plant managers. Widespread prosperity is leading householders to make numerous improvements in residence lighting. Municipalities, in spite of diminished resources, are taking a renewed interest in street lighting. There is substantially no part of the general public but what is at least in a receptive mood to consider better lighting.

With the public generally receptive and a large part of it actually more eager for lighting betterment than ever before, it is quite evident that there are vast opportunities for profitable business in this line if intelligently handled. The question then arises, How and by whom should these opportunities be developed? Looking at the situation broadly, it is clear that the greatest possibilities lie in the lighting of residences, stores and factories. These constitute the great bulk of lighting installations and in each of the three classes the electrical contractor is the privileged party consulted by all the owners except the largest as to the design and execution of any changes that may be effected. This has long been known to be true of small and moderate sized residences and stores and in the industrial lighting survey conducted last year it was shown to be similarly true of factories.

The opportunities in factory lighting are especially emphasized in an article by Mr. W. E. Underwood that appears in this issue. Hitherto the electrical contractors have not pushed this end of their business. In factories power wiring was given by far the greatest attention and the lighting circuits in many cases were actually cut down at the contractor's suggestion. There never were so many facts available to expose the folly of this latter course as now. Fortunately, some contractors have been awake as to the importance of abundant and well distributed factory illumination, but the great majority still need to be aroused on this point. They should be made to realize that a modern lighting system pays the owner for whom it is put in and it pays the contractor who puts it in properly. There is much meaning in this last word. Unless the system is well designed and installed it is likely to prove a disappointment. Even after it is in service the contractor should take it upon himself to see that it is properly maintained; a lighting maintenance contract is a good investment to the owner and the contractor. It is an old truth in business that a satisfied customer is a permanent customer. It is up to the contractor, however, to see that the satisfaction is based on the most up-to-date equipment and upkeep.

In store and residence lighting also the contractor has too commonly suggested means for cutting down the lighting installation cost instead of suggesting means for increasing the satisfaction possible from an improved lighting effect. In the article referred to, Mr. Underwood points out that much greater success is obtained in selling lighting effects than merely lamps, reflectors and fixtures. To be able to sell lighting effects, however, the seller must know a great deal more about how a variety of desired effects are obtainable than the average contractor now knows. He needs a great deal of education on modern lighting.

With an intelligent conception of what is now the best illuminating practice, in what ways different effects are readily obtained and how common errors are avoided, the contractor and dealer has at his disposal means for greatly expanding his lighting business, both in wiring and in sale of lamps, fixtures, equipment and other lighting accessories.

Material Transport and Central Stations

The recent annual convention of the Material Handling Machinery Manufacturers' Association, held in New York, emphasized the fact a new science, the science of mechanical transportation, is being developed, that its development is only begun, and that the possibilities for accomplishment in the science are almost beyond the comprehension of even those who have investigated it.

Much has been said since the war began about the use of labor-saving machinery. But only a few who have used the term have had an adequate conception of it. Even the industrial engineers who have been introducing system in manufacturing processes have failed to comprehend the entire significance of the science of mechanical handling. They have been concerned more with studies intended to make the best use of equipment available than to select or devise material-handling equipment suitable for various purposes. The complete development of the material transport problem means the construction and installation of equipment suitable for an industrial establishment before it begins to operate.

An important phase of the development of the science is its relation to and dependence on the central-station companies. The progress of the development will depend considerably upon their attitude. If they lend their assistance in promoting the idea of material transport, the science will be developed much more rapidly than if they withhold their assistance. They have everything to gain from its development since they will supply the energy required to operate much of the material-handling machinery. Perhaps it is a bit ambitious to hope that every port, terminal and other industrial plant will be equipped with a full complement of mechanical handling devices and that every possible man will be replaced by a machine. This situation may never be realized. But in view of the fact that a recent impartial canvass of several manufacturing plants showed that only 5% of those investigated are extensively equipped with modern mechanical transport machinery and that 65% of the executives are entirely unfamiliar with such machinery shows that a tremendous development of the science of mechanical transportation is possible. Central-station companies will be amply repaid for hastening its development by increased revenues. And they will be repaid in addition by the satisfaction of knowing that they have been instrumental in speeding production at a time when speed is essential.

Central-Station Men and the Goodwin Plan

The fast-growing tendency for the different branches of the electrical industry to get together and work in harmony and co-operation was startlingly illustrated at the meeting of the New-Business Committee of the Indiana Electric Light Association at Fort Wayne, Ind., last week when William L. Goodwin, originator of the Goodwin plan, was the principal speaker at the banquet that followed the business session.

That Mr. Goodwin should attend a banquet given by central-station organization men is not necessarily an out-of-the ordinary incident, but Mr. Goodwin attended the particular banquet as the guest and on the invitation of the New-Business Committee, essentially a central-station organization.

Mr. Goodwin, in opening his address, called attention to this fact and said it was the first time in the more than three years that he has been working to put the commercial handling of electrical apparatus and devices on a proper basis that he had been asked to address a central-station organization. "Usually they can't see me, even with the aid of a Lick telescope," remarked Mr. Goodwin as he thanked the Indiana men for their invitation.

In his address, Mr. Goodwin pointed out to the central-station men that neither they or the contractor-dealers need to fear the competition of the other. There is room for both, he pointed out, and he made it clear that in his opinion it was the province of the central-station companies to exploit and popularize electrical apparatus and devices, particularly new inventions, and leave the selling end largely to the contractor-dealers. If this is done, he said the business of the electrical industry would amount to $10,000,000,000 yearly in five years' time.

Opportunities for Export Trade

One of the most pressing problems in the world today is that of fuel economy made necessary by decreased production of coal and by the increase in its cost. In Europe this necessity is even greater than in the Uniter States. Reports reaching the National Foreign Trade Council show a tremendous and continued opportunity for the American electrical manufacturing industry in supplying the needs of foreign countries which are now forced to develop their electrical energy to the utmost.

Italy is soon to carry out large electrification projects, it being planned to electrify 6000 kilometers of railroads. Portugal probably will follow in Italy's footsteps. In France a bill has recently been passed for the canalization of the Rhone river from Lake Geneva to the Mediterranean sea. The swiftness of the river's current will be modified by means of a series of locks and dams, the latter being utilized for generating electrical energy and for irrigating purposes. The plan provides for 19 large generating stations, which will furnish electrical energy ranging from 12,000 to over 70,000 hp. per station. It is estimated that the Rhone river is capable of generating energy equivalent to 760,000 hp., or 4,848,000 kw-hrs., annually, which will amount to a saving of nearly 500,000,000 tons of coal.

CURRENT EVENTS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

RAILWAY ELECTRIFICATION IS DISCUSSED AT CHICAGO.

Engineering Organizations Hold Joint Meeting For Consideration of Subjects Pertaining to Electrification of Steam Railroads.

A joint meeting of the Chicago Section, American Institute of Electrical Engineers; Chicago Section, American Society of Mechanical Engineers; the Western Railway Club, and the Electrical and Mechanical Sections of the Western Society of Engineers was held in the rooms of the latter organization March 4, the principal topic being the electrification of steam railroads. In view of the proposed electrification of one of the Chicago terminals and also of the recent return of the railroads to private ownership, with attendant contemplated rehabilitation, the meeting was of more than usual importance.

The speaker of the evening was S. T. Dodd, engineer of electrification, General Electric Co., whose subject was "Some Comments on the Present Status of Steam Electrification." He presented data and material collected by himself together with a review of several recent papers on the subject by other authorities. He reaffirmed the statement that great savings in cost of coal and maintenance can be accomplished by way of electrification, and called special attention to the need of electrified railroads where density of traffic is great. The latter is the ideal condition for substitution of electric for steam motive power. He gave figures on the savings in coal that could be accomplished by the creation of the proposed Atlantic super-power zone and by the national electrification of railroads. Equalization of power load, obtained by interconnecting power stations and producing large trunk distribution systems, was also touched upon.

The address was illustrated with lantern slides, by means of which modern aquipment for electrified railroads was shown. The pictures brought out in striking fashion the improvement in the appearance of terminal yards to be made by the use of electricity in railway operation.

The discussion brought out important questions in connection with equipment and plans for electrification. In answer to an inquiry as to the reason for the general use for steam locomotives in new railway projects in Asia and other foreign countries, when electric power might have been chosen instead, Mr. Dodd stated that most of these projects are in territories of sparse population and hence the revenue derived would not pay a profit when the high cost of power-plant and other equipment was taken into consideration. It was stated that in cases of this kind steam operation costs more than electric operation, but, that even with the greater cost, steam operation would pay greater dividends than the electric when capital investment is considered in relation to the amount of traffic.

Some interesting data on the electrically operated section of the Chicago, Milwaukee & St. Paul railway in western Montana was given. It was stated that tests have shown that a reduced impact on rails has been experienced from electric locomotives in comparison with steam locomotives. Engine terminals under electric operation are twice as far apart as they were under steam operation, which has resulted in material savings and simplification of operation. Attention was also called to the fact that electric locomotives maintained their efficiency during the winter season, while steam locomotives were at minimum efficiency during that period.

PROPOSED REVISION OF CODE RULES ON RADIO WIRING.

Institute of Radio Engineers Makes Draft of Revision of Rule 86, to Be Considered at Meeting of Educational Committee.

Rule 86 of the National Electrical Code has been regarded as obsolete for some time, and the Institute of Radio Engineers has come forward with proposed revisions which, if adopted, will undoubtedly improve the situation. The draft of the proposed revision is given below. If these rules so revised are approved at the public hearing of the Electrical Committee, National Fire Protection Association, set for March 23-24, 1920, at 123 William street, New York City, and are adopted, they will be embodied in the 1920 edition of the Code. The revisions are open for criticisms, which should be made in writing and mailed to Dana Pierce, chairman of the Electrical Committee, 25 City Hall place, New York City. The proposed rule is as follows:

86. Radio Signalling Apparatus.

Note.—These rules do not apply to radio signalling apparatus installed on shipboard.

In setting up radio signalling apparatus all wiring pertaining thereto must conform to the general requirements of this Code for the class of work installed and the following additional specifications:

a. Aerial supports are to be constructed and installed in a strong and durable manner. Aerial conductors and wires leading from same to ground switch must be supported firmly on approved insulators such as porcelain knobs of approved design or petticoat insulators. Insulators must be so mounted as to maintain the conductors at least five (5) inches clear of the building wall. In passing the aerial conductor through the side of the building a continuous tube or bushing must be used. The bushing or tube must be composed of noncombustible, nonabsorptive insulating material and must extend five (5) inches beyond the surface of the wall on both sides. The ground switch shall be mounted so that its current-carrying parts will be at least five (5) inches clear of the building wall and located preferably in the most direct line between

the aerial and the point of ground connection. The conductor from ground switch to ground connection must be securely supported.

b. Aerial conductors must be effectively and permanently grounded at all times when station is not in operation by a conductor, the periphery of the cross-section of which is not less than three-quarters of an inch. The ground wire must be of copper or other metal which will not corrode excessively under existing conditions. Ground connection should be made in accordance with the requirements of 15A, sections *o* to *t*, inclusive, except where variation from these requirements may be allowed by special permission in writing.

c. In radio stations used for receiving only, the grounding switch may be replaced by a similarly mounted and grounded short-gap (⅛ inch or less) or vacuum type lightning arrester. The current carrying parts of devices must be kept five (5) inches clear of the building wall.

d. Where the aerial is grounded as specified in sections *a* and *b* the switch employed to join the aerial to the ground connection shall be a knife switch of approved design, the blade of which must have a periphery of not less than three-quarters of an inch and when open the current carrying parts to which the aerial and ground connection wire are attached will be separated at least five (5) inches. The base of the switch must be of a material suitable for high-frequency service. Slate will not be approved.

e. When supply is obtained direct from street service the circuit must be installed in approved metal conduits or armored cable. In order to protect the supply system from high-potential surges there must be provided two condensers (each of not less than one-half microfarad capacity and capable of withstanding 500 volts test) in series across the line with midpoint grounded. A fuse not larger than 10 amperes capacity shall be connected between each condenser and the line wire connected thereto. Each condenser shall preferably be protected by a shunting fixed spark-gap of 1/32-inch separation or less.

f. Transformers, voltage reducers, keys and similar devices shall be of approved types.

GOODWIN URGES CO-OPERATION AT FORT WAYNE MEETINGS.

New-Business Committee of Indiana Electric Light Association and Northern Indiana Contractor-Dealers Hold Meetings and Banquet.

"If the manufacturers will give us the motors and devices to sell, the central stations and contractor-dealers will make the total volume of the electrical industry $10,000,000,000 a year in five years' time," emphatically declared William L. Goodwin at the combined banquet of the New-Business Committee of the Indiana Electric Light Association and contractor-dealers of Northern Indiana, at Fort Wayne, Ind., March 4.

This statement followed one by Mr. Goodwin that the electrical industry had climbed from the $1,000,000,000 a year class to $2,000,000,000 in two years' time, and he pointed out that this increase was largely due to the increased sales of electrical apparatus and devices.

Mr. Goodwin visited Fort Wayne on the invitation of the central-station men and took occasion in opening his address to say that it was the first time he had been asked to speak before a central-station organization. "Usually I have had to jimmy my way into central-station association meetings," he said, "and, as it were, beard the lion in its den, and the fact that I have been invited to attend a central-station meeting shows that all branches of the electrical industry are realizing the necessity of co-operation."

Then, in characteristic Goodwin style, he proceeded to point out some of the shortcomings of the central-station men, according to the Goodwin opinion, and he spared neither them nor the contractor-dealers in his address, which was the feature of the banquet and took more than three hours to deliver.

Mr. Goodwin said that the central-station and contractor-dealer associations must get together and work in harmony at all times and that each must realize that the other was necessary to its welfare. He said that in towns where there was a good central-station organization the standard of the contractor-dealer business would be found to be higher than when that condition did not prevail.

Among a host of other things Mr. Goodwin insisted strongly that it was the province of the central-station company to advertise and popularize new devices and also to keep the older ones before the public eye. To the contractor-dealers, he said, "Forget the competition of central stations; they must exploit and popularize devices."

New-Business Committee Discusses Domestic Refrigeration.

About 50 representatives of central-station companies attended the afternoon session of the New-Business Committee of the Indiana Electric Light Association, while a like number of contractor-dealers were present at the contractor-dealers' meeting, where Mr. Goodwin spoke in the afternoon and outlined the Goodwin plan. At the banquet in the evening 176 persons, representing central stations, contractor-dealers and manufacturers, were present.

The central-station meeting was presided over by Charles B. Hart, of Fort Wayne, chairman of the Commercial Section of the Indiana association. Following a brief address of welcome by Sam W. Greenland, general manager of the Fort Wayne & Northern Indiana Traction Co., and a short talk by Philip H. Palmer, of Kokomo, Ind., president of the association, Chairman Hart announced that Robert Montgomery, manager of the commercial department of the Louisville (Ky.) Gas & Light Co., who was scheduled to present a paper on "Domestic Refrigeration," was unable to be present, owing to illness, and that his paper would be read by O. M. Booher, contracting agent of the Indiana Railways & Light Co., Kokomo. This paper is printed in full elsewhere in this issue.

In Mr. Montgomery's paper it was pointed out that the refrigerating machine made good returns as an energy-consuming device, ranking as one of the largest revenue producers in the domestic appliance line. He said that a domestic refrigerating machine must be automatic in operation and hence must be foolproof and designed to operate without any attention whatever, except occasional oiling.

Discussion on the paper was opened by H. E. Gant, contracting agent, Marion Light & Heating Co., who said the main question in domestic refrigeration was the reliability of the device as the installation cost is high. In his opinion, it costs more to operate the machine than to maintain an ice-cooled refrigerator. He declared a campaign to popularize the device was a good

one for any central-station company to undertake.

H. E. Crane, General Electric Co., Fort Wayne, said he had followed the operation of domestic refrigeration apparatus for seven years and that the apparatus was a good source of revenue to the utility companies. Mr. Crane urged against making the cost of the device too low and also urged that the advantages of mechanical refrigeration be emphasized, so that even if the device proved more costly to maintain than an ice-cooled refrigerator the cleanliness, even temperature maintained and general reliability of mechanical refrigeration would offset any additional cost. He pointed out that many boxes now used for ice-refrigerating purposes were not properly insulated and that with a mechanical device installed would not give proper satisfaction. Refrigerators properly built for mechanical operation should only be used, was Mr. Crane's claim. E. J. Condon, president of the Indiana Utilities Co., Angola, Ind., said the public would have to be educated to the use of the refrigerating device, and similar views were expressed by President Palmer of the association.

INDUSTRIAL HEATING.

The balance of the afternoon session was taken up with the reading of a paper by R. Thurman, Muncie Electric Light & Power Works, on "Industrial Heating." Mr. Thurman declared that the two years of United States participation in the world war did more to develop electricity as applied to industrial heating than would ordinarily have been done in ten years. Mr. Thurman confined his paper to the resistance type of heater and divided these into three classes, taking as the first class electrically heated ovens used for japanning, baking and drying. He said that in the United States today there are approximately 1,250,000 kw. connected in japanning ovens. Every large automobile manufacturer and many other industrial concerns do their japanning in this way, among these lines being adding machines, typewriters, cream separators, telephone equipment, bottle stoppers, switchboard apparatus, conduits and condulets, enameled wire, machine tools, stoves and ranges, hairpins, paint brushes, domestic heating appliances and iron beds and bedsprings. Electrically heated ovens are found superior to any other for core baking, declared Mr. Thurman, even though the power bill for the electric oven exceeds that for the fuel-fired oven, the increased production and assurance of getting perfectly baked cores continuously with a minimum of attention offsetting the increased operating cost.

Discussion on the paper brought out the fact that practically all of the central-station representatives were devoting efforts to obtaining contracts for industrial heating in such proportion as their power plants were able to take care of the increased load. M. S. Caldwell, Indiana & Michigan Electric Co., South Bend; A. Dunn, Westinghouse Electric & Manufacturing Co., and others took part in the discussion.

In the interim between the afternoon session and the banquet many of the convention visitors made a tour of inspection through the small motors, meter and transformer departments of the Fort Wayne branch of the General Electric Co.

At the contractor-dealer afternoon meeting the addresses on the Goodwin plan made by W. L. Goodwin and Samuel Adams Chase were the principal features. Mr. Goodwin explained in detail his plan and then spent an hour answering questions asked by those present. Preceding Mr. Goodwin, Eph Dailey, of Fort Wayne, read a paper on "The Need of Organization," which paved the way for the Goodwin address. A. I. Clifford, of the Fort Wayne Oil & Supply Co., was chairman of the contractor-dealers' meeting.

WESTINGHOUSE COMPANY GIVES INSURANCE TO EMPLOYES.

Announcement Made That Company Makes Gift to Each of Its 50,000 Employes of $500 Insurance Policy.

An insurance policy for the sum of $500 will be given to every employe of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., who has been in the service of the company for a period of six months or more, according to a statement made by one of the officials of the company. The plan became effective March 1.

In addition, the employes, after April 1, may increase the value of their policies to amounts varying from $1000 to $2000, depending upon their length of service and continuity of savings. All employes who have been in the company's service for six months or longer and who deposit a sum each payday in the employes' savings fund equal to 2% or more of their earnings will not only receive 4½% interest compounded semi-annually on such deposits, but in addition will automatically have their insurance policies increased to amounts up to $2000, depending on the length of time they have been in the company's employ.

The insurance plan is to be made effective at all of the various offices and plants of the Westinghouse Electric & Manufacturing Co. and will affect approximately 50,000 people.

AYLESWORTH WILL ADDRESS WISCONSIN CONVENTION.

M. H. Aylesworth, executive assistant to President R. L. Ballard, of the National Electric Light Association, will be one of the speakers at the annual convention of the Wisconsin Electrical Association to be held at Milwaukee, Wis., March 23, 24 and 25, having as his subject, "The Relations of the Central Station to the Public." Other subjects to be discussed at the convention are "Cost Production Less Depreciation," by Paul Stark, district auditor of the Eastern Wisconsin Electric Co., Sheboygan, Wis.; "Possibilities of City Street-Car Operation," by E. M. Walker, general manager, Terre Haute, Indianapolis & Eastern Traction Co., Terre Haute, Ind.; "Development of Small Water Powers in Wisconsin," by E. L. Hinchcliff, district superintendent, Ashland Light, Power & Street Railway Co.; "Development of Automatic Substation Equipment," by a Westinghouse Electric & Manufacturing Co. representative, and a

report of the committee on the extension of rural lines. E. J. Pulliam, Milwaukee, is secretary-treasurer of the association.

MORE RAILWAY ELECTRIFICATION WORK IN ENGLAND.

In 1913 the London & South Western Railway carried in the area since electrified 25,000,000 passengers. Towards the end of 1915 the first section of electrified line was opened from Waterloo (London) to Wimbledon via East Putney. Other sections followed at close intervals. In 1919 there were carried over all these electrified sections just under 48,000,000 passengers, an increase of 70,000 per day as compared with 1915. But for the war, the company would have been able to go on with the scheme and a much larger number of electric trains would have been running. The question is now under serious consideration of extending the electrification to cover the Cobham and Leatherhead lines as far as Guildford at a cost, including coaches, of $3,750,000, or about three times what it would have cost at pre-war prices. The advantages of electric service, however, are so pronounced that the directors say they have no hesitation in giving orders for the work to proceed.

Another piece of electrification reconstruction is connected with the Waterloo and London city tube which runs beneath the River Thames. The London and South Western Railway owns this tube and it is about to supersede the present electrical equipment by modern equipment so as to increase the speed of the trains. Additional all-steel coaches are being ordered and the trains will be lengthened.

In regard to the City and South London tube (the pioneer railway of its kind) which is intending to enlarge its tunnels throughout and is experimenting at present in order to decide what is the best system to adopt for proceeding with the work, has an improvement scheme in prospect costing between $10,000,000 and $15,000,000, but as in the case of other London underground lines, there is reluctance to proceed with large outlay until the financial position is rendered more satisfactory by an increase in fares. This matter is now before the British Parliament in the shape of a bill promoted by several of the London tube companies in which powers to raise charges to the passengers are shown to be vitally necessary if the increased wage and other financial liabilities are to be met and a modest return is to be assured on the invested capital.

WATER-POWER PLANT FOR RAINIER NATIONAL BANK.

The Rainier National Park Co., the purposes of which are to further improve and enhance the attractiveness of Rainier National Park, in western Washington, has awarded a contract to the Puget Sound Bridge & Dredging Co., Seattle, to install a hydroelectric power station in the park. The plant is to be completed by July, and one of the main features of the service will be to furnish energy for electric heaters in all the rooms of the tourist hotel in that park.

The electrical equipment, which has already been purchased, will consist of one 400-kv-a., 2300-volt, three-phase, 60-cycle alternator, to be direct-connected to a horizontal, impulse hydraulic turbine of 500 brake hp., and which will operate under a 500-ft. head. The turbine governor will utilize a rotary nozzle in connection with the waterwheel operation. In addition to the above there will be a direct-connected exciter, and three 125-kv-a. outdoor transformers. Water will be conveyed from a glacial stream to the turbine by means of a pipe line 5000 ft. long.

ILLUMINATING SOCIETY PLANS NATIONAL LIGHTING WEEK.

Several new projects are occupying the attention of the Illuminating Engineering Society at this time, among them the plan of establishing a "National Lighting Week" in an effort to popularize good lighting. A committee is being formed to consider the proposal and make recommendations. The Society has also entered the field of artistic lighting, where the effect is the main thing to be considered. In this connection a committee in artistic treating of interior lighting has been formed with Samuel G. Hibben, Westinghouse Lamp Co., as chairman, with authority to select the other members of the committee. The Society now has 1200 members and President Doane is confident this number will be largely increased in the near future.

HOUSEHOLD APPLIANCE DATA WILL AID ENTIRE INDUSTRY.

Data on electrically operated home devices, now being compiled by the Industrial and Domestic Power Committee of the American Institute of Electrical Engineers, will be of great benefit to engineers, architects as well as to all branches of the electrical industry. It will do much toward leading to standardization of electrical devices in switch control, wattage of heating elements, attachment plugs, motor designs and in many other ways aid in engineering work on electrical apparatus.

JOBBERS OF NEW ENGLAND PLAN BETTER TRADE CONDITIONS.

The New England Electrical Supply Jobbers' club is a new organization in that section having for its object the betterment of conditions among jobbers, contractor-dealers and central stations. Conferences and co-operation between the different bodies will be held to plan for constructive working on the part of these interests. W. F. Abely, assistant manager, Western Electric Co., New England branch, is chairman of the new organization, and Almon Foster, of the Foster-McDonald Co., Boston, secretary.

CLEVELAND ROTARY CLUB TO HOLD ELECTRICAL LUNCHEON.

James M. Wakeman, general manager of the Society for Electrical Development, will speak at a special electrical luncheon given by the Rotary Club in Cleveland on March 18. The subject of the lecture will be concerned with the

development of the electrical industry during the past ten years. During the course of the lecture Mr. Wakeman will present statistics of the various branches of the industry touching particularly upon the use of electricity in the industries and upon proper industrial lighting. Considerable attention will be given to a description of the campaign that the Society for Electrical Development is beginning in an effort to improve the condition of lighting in industrial plants.

WOMEN IN ENGINEERING WORKS IN GREAT BRITAIN.

Some 5,000 firms in Great Britain have been asked by the Women's Industrial League for a statement of their experience of women as industrial workers. Over 1,400 replies have been received, covering a wide field in engineering and other trades. In the main they may be regarded as satisfactory by a league whose object is to secure equal opportunity for employment in all occupations to men and women. The replies, as scheduled, show that 1,422 firms were employing 79,700 women at the end of May, 1919, as compared with 43,200 before the war and 245,300 during the war. Of 382 firms who employed women before the war, 67 propose to increase the number, in consequence of the larger experience of women's work gained by them; while of 764 who employed women for the first time during the war, 228 proposed to retain them. These firms do not comment on the present labor situation. A further 97 firms state that they would be willing to retain women but for trade union opposition. Taking all the figures, the estimate is that over 60% of those who have tested women's work are ready to continue employing them. Nor, for various reasons, must it be assumed that the remaining firms are necessarily unwilling to use women's labor.

LARGER ACTIVITIES PLANNED FOR MANUFACTURERS' COUNCIL.

In order to more fully develop the work for which it was formed, that of co-ordinating the work of the three member associations, the Electrical Manufacturers' Council has appointed Frederic Nicholas permanent secretary with headquarters in New York City. The Council is made up of four representatives each from the Electric Power Club, the Associated Manufacturers of Electrical Supplies and the Electrical Manufacturers' Club and has been in existence four years. Among matters to be taken up early in the new campaign is a uniform cost accounting system which it developed for electrical manufacturers. The Council holds six meetings a year, the next one being scheduled for April.

INTERNATIONAL STANDARDS BODY TO MEET IN BELGIUM.

Members of five of the advisory committees of the International Electrotechnical Commission will meet in Brussels, Belgium, on March 27 to discuss proposals for new international standards. The Commission has eight committees but only five will be represented in Brussels. These are Committees Nos. 1 and 3 on nomenclature and symbols, which will meet together. Committee No. 2 on rating of electrical machinery, No. 4 on prime movers and No. 8 on high-tension voltages will hold separate meetings. The United States will be represented by Dr. C. O. Mailloux, recently elected president of the Commission, C. E. Skinner, L. W. Chubb, H. M. Hobart, A. H. Moore and Dr. P. G. Agnew. Part of the American delegation has already sailed for Belgium.

STANDARDS COMMITTEE ADJUNCT OF ASSOCIATED MANUFACTURERS.

Under a new plan adopted by the Associated Manufacturers of Electrical Supplies proposed new standards will originate in the 22 sections of the association and will then be sent to the newly-formed General Standards Committee for adoption and publication. The new committeee will be composed of one representative from each of the 22 sections. The complete plan calls for the submission to the General Standards Committee for adoption, then reference back to the sections interested for final ratification, thence to the board of directors for approval and then to the committee for publication. LeRoy Clark, Safety Insulated Wire & Cable Co., has been named chairman of the committee, and C. A. Bates, Bryant Electric Co., secretary.

COMING CONVENTIONS.

Wisconsin Electrical Association. Annual convention, Milwaukee, Wis., Mar. 23-25. Headquarters, Hotel Pfister. Secretary, E. J. Pulliam.

American Electrochemical Society. Annual convention, Boston, Mass., April 7-10. Friday, April 9, joint session with American Institute of Electrical Engineers on "Electrically Produced Alloys." Secretary, Joseph W. Richards, Bethlehem, Pa.

American Association of Engineers. Annual convention, St. Louis, Mo., May 10 and 11. Headquarters, Planters Hotel. Secretary C. E. Drayer, 63 East Adams street, Chicago.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 13-15. Headquarters, Hotel Galvez.

National Electric Light Association. Annual convention, Pasadena, Cal., May 18-21. Headquarters, Hotel Huntington. Acting secretary, S. A. Sewall, 29 West 39th street, New York City.

American Institute of Electrical Engineers. Annual convention, White Sulphur Springs, W. Va., June 29-July 2. Headquarters, The Greenbrier. F. L. Hutchinson, secretary, 33 West 39th street, New York City.

Ohio Electric Light Association. Annual convention, Cedar Point, Ohio, July 13-16. Secretary, D. L. Gaskill, Greenville, Ohio.

Pacific Coast Section, American Institute of Electrical Engineers. Annual convention, Portland, Ore., July 21-23.

National Association of Electrical Contractors and Dealers. Annual convention, Baltimore, Md., Oct. 6. Secretary, W. H. Morton, 110 West 40th street, New York City.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

FREE LAMP RENEWALS AS CENTRAL-STATION PRACTICE.

Difference of Opinion as to Value of Free Renewals Is Shown in Symposium of Views of Large and Small Organizations.

That central-station companies are departing from the policy of making free lamp renewals is shown by the change, rather gradual in some sections, toward a policy of charging resale prices for all renewals of standard lamps. It was only a few years ago that the majority of lamps were furnished on a so-called free-renewal basis. Today there are only a very few of the larger lighting companies in the country that have not changed their policy in this respect, and even in some of these companies modifications have been made in the way of charging for delivery of free-renewal lamps, etc.

In Chicago, the Commonwealth Edison Co. makes all renewals of standard lamps free The same condition prevails in Detroit, Boston, Philadelphia and other cities, while on the other hand in such cities as Brooklyn, Philadelphia and Duluth, the large electric service companies do not make free renewals. Among the smaller central-station companies there is also a diversity of policy, some companies, comparatively few in number, however, still making free renewals.

The free-renewal situation was changed considerably by the introduction of tungsten lamps, which are recognized now as a standard. Over 90% of the lamps manufactured are of the tungsten type.

In a committee report made at the last annual convention of the National Electric Light Association it was pointed out that central-station companies should merchandise tungsten lamps because they are advertised nationally and locally and are becoming exceptionally well known to the buying public. They are on a well-established basis as to quality, which insures a certain profit to the lighting company, instead of the expense as heretofore, where lamps were sold at or below cost or given free.

It is interesting to note the experience of one large central-station company after it had eliminated free renewal of tungsten lamps and placed them on a strictly merchandising basis. It was found that more lamps were sold than were ever given free. Careful and accurate records showed higher wattage lamps in use than previously, resulting in more lamps being purchased from the manufacturer, more lamps sold by the central-station company and also a larger income to the company.

Some interesting views are given by central-station executives in discussing the lamp-renewal subject. Joseph B. McCall, president of the Philadelphia Electric Co., says:

"We are firmly of the opinion that the control of the lamp installation and the lamp renewal should remain with the central station. We stress the fact nowadays that we are selling 'electric service' and not merely light or power or heat, as the case may be. A vital part of lighting service is the maintenance of lamp installations at a point of highest efficiency and, to make more or less certain this condition, we believe in selling the lamp for installation purposes at cost and the renewing of some lamps, other than standard, at a differential cost, based on the relationship which the wattage and life of the lamp bears to the cost to us of free renewal of standard types.

"Our company is opposed to the sale of lamps at list price by dealers as well as by central-station companies because of the immediate loss of control of the lamp installation and the attendant impairment of the service which would follow. Lamps of various wattages sold at various list prices would mean deterioration in efficiency in 99 out of 100 installations. It is human nature for the average individual, whether householder or storekeeper, to replace burned-out or partially burned-out lamps by other lamps at the smallest possible expense. This would mean the purchase of lamps of incorrect wattages for specific locations and specific shades, etc., and would mean the rapid destruction of illuminating standards and methods which have been built up through many years of patient and expensive endeavor on the part of illuminating engineers and central-station managements.

"The agitation which has been carried on for several years, with the hope that the central-station companies would abandon the traditional lamp-renewal policy, seems to be based on the mistaken premise that the electrical dealers are being deprived of a large profit on the sale of lamps to central-station customers at list prices. As a matter of fact, this policy in practice has proven that at least 50% of the lamps used for the installation and renewals of central-station customers would still be purchased from the company. The profit on the remaining 50%, which, for the sake of argument, let us say, would be sold by electrical contractors and dealers, would be very small indeed if the dealer charged against this profit the overhead and additional specific expense to which he would be put in order to properly handle this business."

The Edison Electric Illuminating Co. of Boston maintains a policy of renewing lamps free or with a proper excess charge, provided they are Mazda lamps. "This policy has been maintained," says President C. L. Edgar, of the company, "after making an investigation and hearing statements of companies which have

departed from this method of supplying lamps. The Boston Edison company is more than ever convinced that it is right and that other policies are wrong."

The Detroit Edison Co. does not furnish first installation of lamps under commercial lighting agreements, but does renew 40, 60 and 100-watt lamps free for both residence and commercial lighting customers.

In Duluth, Minn., the Duluth Edison Electric Co. has never made a practice of furnishing lamp renewals free through the use of any exchange arrangement. A. W. Hartman, president of the company, says that by handling lamps on the same basis as contractor-dealers the company has found that it receives better co-operation from the dealers.

The Brooklyn Edison Co. adheres to a policy of selling all lamps at regular resale prices, and the Consolidated Gas, Electric Light & Power Co. of Baltimore follows the same policy.

ELECTRIC RATE-MAKING ELEMENTS EXPLAINED FOR CUSTOMERS.

Pacific Coast Engineer Expresses Clear Views on Subject That Often Proves Confusing to Central-Station Patrons.

Much of the somewhat intricate problem involved in rate-making for consumers of electrical energy was clearly explained by W. G. Vincent, Jr., valuation engineer of the Pacific Gas & Electric Co., in an address on "The Elements of Rate-Making," delivered before the Electrical Development League of San Francisco recently.

Customers of an electric service company, particularly householders, who have been wont from time to time to express dissatisfaction with the bills rendered them for electric service, who have been unable to understand why the rates charged for electric service are not uniform, who, for instance, are unable to see why they are being charged a higher rate for the electric light supplied them in their homes than many heads of families pay for electrical energy supplied to their factories or farms can have the problem made clear to them if the text of Mr. Vincent's address is made available for them.

His address was devoted to a not too technical explanation of the much-talked of but little understood "kilowatt-hours." He undertook to answer the often asked question why kilowatt-hours cannot be, and are not, sold like merchandise or potatoes, i. e., at the same price to all, regardless of time, place or quantity. He explained, first, that the kilowatt-hour is a unit of energy, made up to the unit of force, the kilowatt, and the unit of time expressed by an hour; but the kilowatt-hour is not to be taken as strictly a unit of service. To quote Mr. Vincent:

"One kilowatt-hour has no more resemblance to another in the service rendered, value or cost, than the potato resembles the alligator pear, although both may have the same food value."

In other words, while for want of a better system of reckoning, electric service is translated into kilowatt-hours, this does not mean that all electric service is of the same value or costs the same to produce and deliver. For example, a supply of electricity of the volume of 4 kw. during a period of 15 minutes is, in the bill rendered to the consumer, reckoned as 1 kw-hr.; but in other respects it cannot be taken as the same of 1 kw. of energy supplied for the period of one uninterrupted hour, although the charge must be the same in the bill.

It would appear from this that the term "kilowatt-hour" as the basis of charge to the consumer for electric service is not entirely satisfactory; however, it is the one in use at the present time, and for want of a better term it is used by the electric service companies.

The main reason, as explained by Mr. Vincent, why the electric company cannot base its charges for service upon an even system such as that employed by the merchant are as follows:

First, the electric company supplies a great variety of service and with a large number of consumers with a wide range of individual and class requirements; second, electricity cannot be stored in large quantities, so that it can be used in large or small quantities at various hours of the day or night according to demands, but its machinery and equipment must be at full capacity at all times and ready to serve any quantity of the product at an instant's notice; third, the turnover of the electric company's capital is very low, that is, its gross revenue in a year is only 15 to 25% of its investment, so that a large proportion of its revenue goes to meet fixed charges and the company must be continually seeking new capital in order to meet the growing demand for service,

Mr. Vincent pointed out that the rate problem is far from a final solution. It has occupied some of the best minds in the electrical industry for years. It has been decided, however, that the factors which affect and largely determine the cost of supplying service by every electric utility are three in number: first, the number of consumers supplied; second, the maximum demand upon the plant made by consumers; third, the amount of energy or kw-hrs. required by the consumers during a given period of time.

To illustrate his points Mr. Vincent used a chart upon which was shown an electric power house from which lines radiated east and west. One line, running eastward, connected with a factory which consumed a supply of 4000 kw. of electric energy, day and night; another line of equal length in a westerly direction ran to a town where a supply, also of 4000 kw., was distributed among the inhabitants. The cost of the electric power plant was given at $1,000,000 and the cost of the two lines therefrom at $50,000 apiece; but it was shown that where the cost of distribution to the factory began and ended with the $50,000 line the cost of distribution to the city took in an electric substation, valued, say, at $100,000, and a perfect network of distributing lines to the various residences, offices, stores and buildings in the town, which represented here a cash investment to the electric company of $900,000.

It was shown very clearly from this diagram upon what theory the electric company is compelled to make its charges for electric service; in other words, that the small consumer demanding service at what is called the peak-load time and whose consumption is not upon any regular or steady flow basis must, in all fairness, pay

for that service his proportion of the cost to the company to give him that service.

To supplement the chart was shown the following table representing the various elements that go into the rate-making schedule. The table shows in one column the conditions affecting the one consumer to the eastward (the factory) and the other the 10,000 consumers in the town among whom a supply of energy equal to that supplied the factory is distributed. The table follows:

	Factory.	Town.	Total.
Consumers	1	10,000	10,001
Demand, kw.	4,000	4,000	8,000
Investment			$2,100,000
Sales per kw-hr. per day	96,000	18,000	114,000
Sales per kw-hr. per year	35,040,000	6,570,000	41,610,000
Fixed charges—12%			$252,000
Operating expenses 1 ct.			480,000
Total costs			$732,000
Kw-hrs. generated	38,500,000	9,636,000	48,130,000
Av. revenue required per kw-hr.			1.75 cts.
Fixed charges:			
12% on plant	$ 60,000	$ 60,000	$120,000
12% on local	6,000	126,000	132,000
	$ 66,000	$186,000	$252,000
Operating expenses:			
Exclusive of plant	$ 2,000	$ 78,000	$ 80,000
Plant—Exclusive of fuel	20,000	20,000	40,000
Fuel	288,000	72,000	360,000
	$310,000	$170,000	$480,000
Total costs	$376,000	$356,000	$732,000
Av. cost per kw-hr.	1.08 cts.	5.42 cts.	1.75 cts.

It was shown by this table that while the average cost to the company per kw-hr. supplied to customers from this power plant was 1.75 cents yet the average cost of supplying the town was no less than 5.42 cents as against 1.08 cents per kw-hr. supplied the factory.

ELECTRICAL SPIRIT IN NATIONAL ADVERTISING ILLUSTRATIONS.

Co-operation Between General Commodity Advertisers' Division, N. E. L. A., and National Advertisers of Mutual Advantage.

Another evidence of the nation-wide activities of the National Electric Light Association is given in the work of the General Commodity Advertisers' Division of the Commercial Section. This division, of which Earl E. Whitehorne is chairman, was established for the purpose of exerting an influence on the advertisers of general commodities to feature electrical appliances in the background of their advertising displays, when it is proper for them to show modern household equipment of this type rather than old-fashioned devices now obsolete. In soap advertisements, for instance, it has been customary to picture women washing by hand, in hand tubs on rub boards. In coffee advertisements, pictures of alcohol percolators have been common. It would be a distinct advantage to the electrical industry if an electric washing machine or an electric percolator were shown instead.

The division does not expect to accomplish this result quickly, for to do so requires the selling of the idea both to the manufacturers of these general commodities themselves and to the advertising agencies who prepare the displays for the publications. Attention will be secured and interest aroused, so that there will be a gradually increasing number of advertisements in the popular magazines that will be featuring electrical household appliances in the background pictures of the advertisements of general household commodities.

HOW A FARMER RECEIVED PAY AS AN ELECTRICIAN.

Taking Over of Railroads by Government Results in Peculiar Paradox.

Several years ago, before the railroads were taken over by the government, a railroad in the Middle West installed a pumping station near a small creek at a point on its right-of-way, several miles distant from any station. The pump was operated by an electric motor. Rather than leave the caretaking of the pumping station to the nearest station agent, arrangements were made with the farmer on whose land the pumping station was located to visit the station each morning, throw in the motor switch, and see that the equipment was in order. For this the farmer was paid $25 a month. Government control came. One of the first things the government did was to classify all employes and at pumping stations the government experts found an electrician handling the station at a salary of $25 a month. Wrong classification was assumed of course, and apparently no investigation. A little later came increases in wages for all railway employes, including electricians, and also including large amounts of back salaries as the wage increase was made retroactive. One day the "farmer-electrician" was visited by a government official and handed $3200 in back pay and was told that his salary was $135 a month. The railroad is back to its owners now and the farmer is also back to $25 a month as caretaker of a pumping station and not as a $135 a month electrician.

USE OF COLORED LIGHTS IN DISPLAYING WASHING MACHINES.

Passersby are being effectively stopped by a washing machine window display by the Commonwealth Edison Co., Chicago. The feature of interest is the application of multicolored light to the surface of a body of soap-suds in motion above the washing members of the machine.

The effect is created by three lights suspended from above. One brilliant white light throws a dazzling alabaster area on the center of the suds. Two lights, one dark red and the other blue, placed on each side of the white light, give cross color iridescence, and the combination results in an eye-pleasing effect that is almost as efficient in the daytime as at night.

This idea is not new, but the use of the specially brilliant white light in the center seems to give it unusual charm, as attested by the interested groups to be found in front of the window.

The lights used are theatrical floodlights and resemble in appearance an automobile headlight. Dealers will have slight difficulty in securing some substitute for them, concentration of light rays being the important thing. The rich creamy suds is created by the liberal use of borax chips and a little good quality soap.

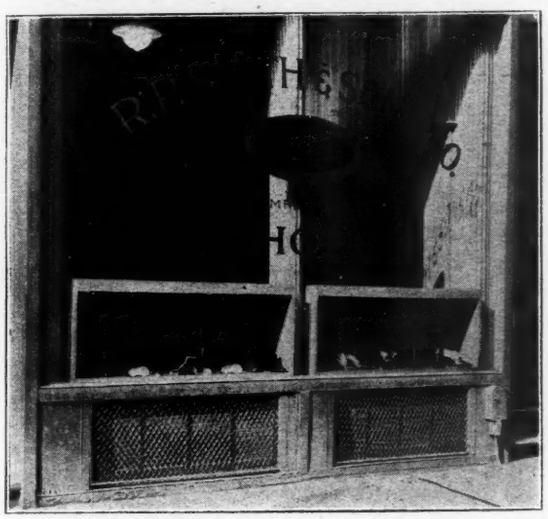
CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

DISPLAY CABINETS TO ELIMINATE SHOW-WINDOW BACKGROUNDS.

Electrically Lighted Cabinets Afford Display Without Interfering with Daylight Illumination of Store.

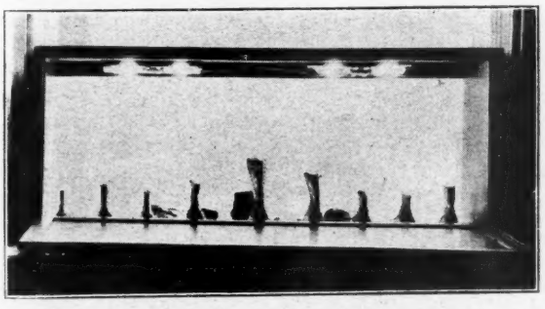
Good lighting is a necessary adjunct to the sale of most merchandise, not only for the sake of displaying goods to the best advantage, but



Window-Display Cabinets Made So Daylight Will Not Be Shut Out of Interior of Store.

for giving a store a business-like and inviting atmosphere. People would rather shop in a well-lighted store than in a dark and dreary one.

More and more merchants are beginning to realize this fact and as a result the various mercantile establishments in any city or town offer



Rear View of Electrically Lighted Window-Display Cabinet, Showing Method of Construction.

an excellent opportunity to contractors and dealers for the sale of lighting units and the installation of wiring.

Managers of stores which have narrow fronts and considerable depth have raised the objection that the introduction of backgrounds, so necessary in effective window display, shuts out too much light in the daytime. The accompanying illustrations show a method of overcoming this objectionable feature. Illuminated display is obtained by means of the cabinets. Yet they are low enough so that no objection can be made as to the amount of daylight that is shut off from the store proper. The cabinets are approximately 2 ft. by 2 ft. by 4 ft. and each contains four straight-side Mazda lamps concealed behind the upper front edge. The backs are hinged at the bottom to allow of convenient access to the articles displayed. The cabinets are portable and the lamps are connected to sockets by means of lamp cord.

OPPORTUNITIES FOR DEALERS IN THE INDUSTRIAL LIGHTING FIELD.

The indifference of electrical dealers to the expanding opportunities in the field of industrial lighting is a subject of comment. In almost any locality a canvass of conditions would demonstrate the fact that as high as 90% of all the industries in the locality would be found to be poorly lighted.

This condition, it has been pointed out, in conjunction with the fact that every industry is now confronted with the absolute necessity of increased production, gives the electrical dealer an opportunity that has never existed before.

The necessity of increased production is only one of the reasons for better industrial lighting. Poor illumination is the cause of low production, spoilage, and fatigue of workers, and a very noticeable improvement is made when proper illumination is furnished. The improvement of industrial lighting does not necessarily mean increased cost of maintenance. It often shows a decrease even where thoroughly satisfactory results are obtained and improvements made.

Industrial lighting is now receiving the attention of men high in the industrial world, and very often they are at a loss to know whom to apply for information on the subject. The electrical dealer who is well informed can take advantage of this condition and should not be satisfied with an occasional order from industrial plants but should be in a position to visit plants and point out where improvements can be made.

NEWSPAPER STARTS CAMPAIGN OF ELECTRICAL EDUCATION.

The *Buffalo Times* has adopted a new plan of co-operation with electric lighting companies, contractor-dealers and manufacturers and now publishes each Tuesday as a regular feature an "Electrical Page," devoted entirely to the exposition of electrical devices for household and other purposes.

Business Hints for the Dealer

Growing Popularity of Floor Lamps—Preparing Window Cards — Wrought-Iron Fixtures with Multicolor Finish — Improving Lighting—Displaying Heating Pads—Value in Window Displays

A few years ago the stately electric floor lamp seemed to bid only for a place and demand similar to its kerosene and gas-burning predecessors. Instead, it has grown to be a household necessity as well as an article possessing great possibilities in the way of enrichment of interiors.

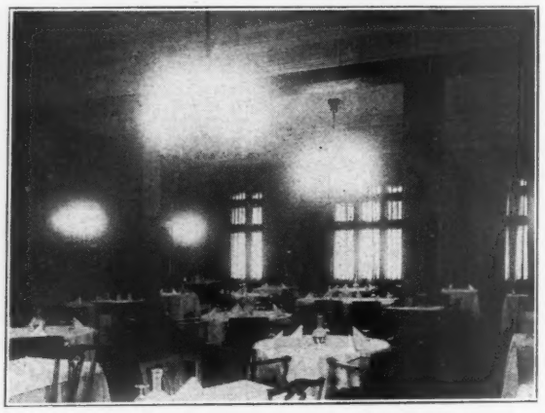
As a result of this growing appreciation on the part of the general public, floor-lamp displays in electric shops are receiving more attention. One cannot help being impressed with the magnitude of this new demand, and it is being reflected by the consideration manufacturers are giving to floor lamps. No article of furniture or electric fixture can boast of more elegant design, workmanship or material.

Aside from the decorative value of the floor lamp, it offers an application of electric light that meets a wide range of needs. The open canopy design permits the popular indirect illumination from ceiling reflection, and at the same time cuts off direct glare at the eye level. The area below the shade has been long appreciated for reading and sewing.

The development and use of floor lamps has reached a point where it is necessary for electrical dealers to pay special attention to more elaborate showings or furniture dealers will make inroads on this desirable business.

Counter and Window Cards.

The appearance and design of cards used for pricing and description of merchandise as well as their color and size are some of the small



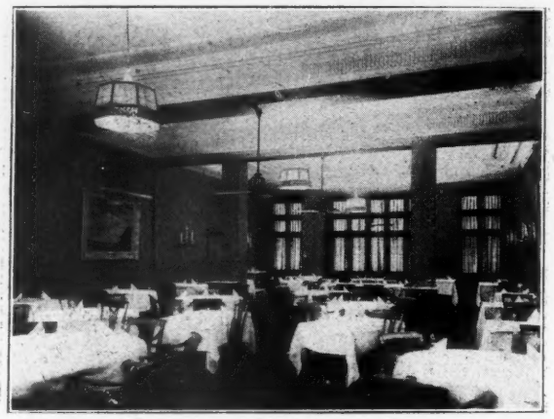
View of Room Showing Unshaded Lamps, Giving Glare and Dark Shadows.

things that count in successful selling. Electrical devices are in themselves attractive and the cards that describe and price them should not suffer by comparison.

The latest developments in this field are usually to be found in many large metropolitan stores. Light tan in a mottled effect seems to be the favored color. The card stock is very heavy with beveled edges. The lettering is artistically designed in white, red, black or blue, with varying combinations. The main idea is to abolish the glaring white cards that have been used so much in the past and that repell instead of attract. The above described window and counter cards are very pleasing in appearance.

Styles in Fixtures.

The introduction of wrought-iron fixtures with multi-colored painted finish has resulted in



View of Same Room Shown in Preceding Illustration with Improved Illumination.

a new line of electric lighting fixtures. The public, according to electric shop men, has responded to it by showing a marked preference.

The new designs are such that the fixtures are not heavy. Iron lends itself readily to detail work, and many of the pieces have leaf and flower effects which the polychrome painting makes very attractive. The colors are subdued in tone, as a rule, and range from dull reds, green and brown to the lighter tints in varying combinations.

This departure from the usual type of fixture may result in a change in the attitude of the public. Those who have types that have become out of date, both in design and illumination features, will be influenced to change their old fixtures for the newer types and benefit by decorative value and improved illlumination afforded.

Proper Diffusion of Light.

The accompanying illustrations show the same room before and after improved lighting units were installed. They are good evidence of what may be done with lighting to improve the appearance of interiors.

The clusters of unshaded lamps shown in the first illustration resulted in lighting the room but they gave uncomfortable glare and dark shadows. The improved lighting units eliminate glare, provide better distribution of light and creates a restful atmosphere in the room.

Doubtlessly there are hundreds of thousands of rooms as poorly illuminated as the "horrible example" shown, every one of which will eventually have its lighting equipment changed to suit modern requirements. The field for the contractor and dealer and the possibilities for this sort of work seem unlimited.

Heating-Pad Window Display.

Sickness probably will be prevalent until warm weather sets in. A window display comparing the superiorities of the electric heating pad with the defects of the old-fashioned hot-water bottle is timely. Few families are without either one of the above articles. The majority are more familiar with the water bag than the electric pad.

A good way of educating the public to the advantages of the latter is suggested in a window-display idea in which the two articles are hung side by side. Appropriate cards in the background call attention to the merits of the pad and the defects of the water bag. The bag is filled with water and is made to leak very slowly by means of pin-holes judiciously placed. The idea is to have the bag wet and dripping very slowly, thus doing away with frequent or continual refilling, while still making it appear a very disagreeable bed-fellow for a sick person. A hand-drawn suggestion of a thermometer may be placed on the side of the bag, with an arrow pointing down to denote loss of heat. This will make the bag compare unfavorably with a similar design printed on the pad, with an arrow pointing to a degree of steady heat. The accompanying window cards can further interest window shoppers by stating differences in weight, durability, quickness of application and size of heating surfaces.

Making a Window Display of Value.

Three hundred and seventy-two people have been seen to stop and observe a window display on the main street of a city of medium size. It is probable that this form of advertising is as effective as any placed before the public. After a person has been stopped by a clever window display or demonstration the attitude toward learning more about it is favorable as a rule. But when anyone has been stopped by a display he should not be disappointed and should learn something to his benefit.

Many displays have the whole story in printed form so clearly in evidence that there is no chance of the observer going on in ignorance of the features he probably would appreciate knowing. One-third display and two-thirds printed facts and explanation has been suggested as a good combination in winning a customer.

DEALERS CO-OPERATE PROFITABLY IN MANUFACTURERS' CAMPAIGN.

Small Electrical Household Convenience Has Big National Sale as a Result of Co-ordinated Effort.

A great deal has been said and written about dealers' helps, manufacturers' co-operation and dealers' co-operation in campaigns to retail electrical devices. Recently one of the manufacturers of socket devices inaugurated a campaign on the sale of two-way plugs. The results are significant.

As hearty co-operation on the part of dealers was vital to the success of the plan, it was put in the form of a contest with cash prizes totaling $450 for the best window displays and similar prizes for the best sales stories about the appliance.

The company also offered to supply without charge complete outfits of sales helps consisting of wall hangers, car cards, posterettes, logotypes, repair tags, price tags, electrotypes, dealer advertisements, newspaper cuts and folders. All of the printed matter was in colors and the campaign was backed up by intensive advertising in national and trade publications and also in newspapers.

Dealer Window Display in Prize Contest.

In response to the offer to supply without charge complete equipment for window trimming and the facilitating of sales, nearly 1000 direct returns were received. Dealers entered into the plan enthusiastically and a mass of photographs of window displays and sales stories were received by the judges. So much material was developed that this company, in addition to the prizes announced, voluntarily recognized the worth of many others by special evidences of appreciation. The results of the efforts of the dealers were beyond the expectations of the company. Although originally planned for the purpose of moving a heavy stock in the hands of jobbers, it increased the demands upon them so greatly that it was with difficulty that all orders were filled.

As a result of the plan above described the desired objective was attained, and in addition to that the dealers and manufacturer secured material of permanent value for further sales development. The product received a national recognition in a form that will be remembered by all who came in contact with it, and consequently made a lasting impression. The benefits from the displays in immediate sales bid fair to continue and with a cumulative effect on future interest in and purchase of the article and others of similiar character.

Recognition of and payment for ideas evolved by salesmen stimulate them to a more frequent application of their ingenuity in merchandising goods. As the old methods become common and fail to attract business, new ones must be brought out; hence the wealth of material collected in a contest of this sort is of value to all concerned—dealer, jobber and manufacturer.

QUESTIONS AND ANSWERS

All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be submitted preferably within eight days of the date of publication of the question and should be limited, if possible, to 300 words. Payment will be made for all answers published.

Questions.

No. 475.—Pricing Motor Repair Work.—Can some of the readers through the questions and answers column give me the best methods of pricing repair work on electric motors, armature winding, etc., and the best methods of setting the selling price of insulating materials and of magnet wire?—D. D., Indianapolis, Ind.

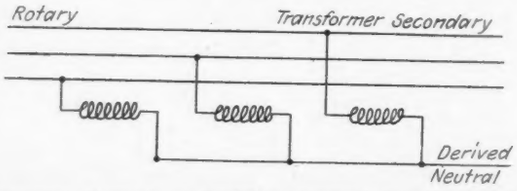
No. 480.—Depreciation Reserve of Utilities.—What is the present prevailing practice on the part of public service commissions as to how the depreciation reserve of public utilities shall be kept? Is this fund always kept separate and distinct from other sinking funds or reserves? Do the commissions approve lumping it in with the general reserve of the utility?—A. E. M., Little Rock, Ark.

No. 482.—Cleaning Power-House Condensers.—What routine methods are usually employed for cleaning condenser tubes? We find that the dirt in our tubes changes at different times of the year, sometimes causing a hard brittle scale, at other times forming a slimy mass, like vaseline. How can this condition be overcome? What methods of cleaning are usually used?—J. M. McN., Tacoma, Wash.

No. 484.—Gilsonite.—Can someone advise me as to what Gilsonite is? What are the properties of this material and where is it found? I understand that electrical insulating paints are made from this Gilsonite. If this is true, is the paint a good one for the windings of electrical machines?—B. D. M., St. Joseph, Mo.

No. 485.—Alternator Causes Flickering of Lamps.—In the plant where I work we have a 25-ampere, 2300-volt, three-phase alternator driven by a 75-hp. Corliss engine, which we run on at peak periods. This unit is about 25 miles from the main plant. When the alternator comes in bad flickering commences which does not stop until the alternator is cut off. What can be the cause and remedy? Cards taken on the engine show it to be all right and the alternator has the correct speed. I have cut off the steam on the engine and disconnected the valve gear, running the alternator as a synchronous motor, and the flickering is then worse than when the engine is carrying load. The unit was first installed in the main generating plant before being moved and no trouble was experienced. Is hunting or unbalanced phases the cause?—E. A., Pine City, Minn.

No. 486.—Reactance to Obtain Derived Neutral.—The company I work for has a compound rotary converter rated at 300 kw., 250 volts, 1200 amperes d-c.; three-phase, 60 cycles; and a 158-volt, 80-ampere, three-phase, 60-cycle reactance. As it is desirable to have a three-wire d-c. system instead of a two-wire system, could this reactance be used in obtaining a derived neutral as illustrated? Would it take the place of the regular reactance between a rotary and its transformers?—L. S. K., Hammond, Ind.

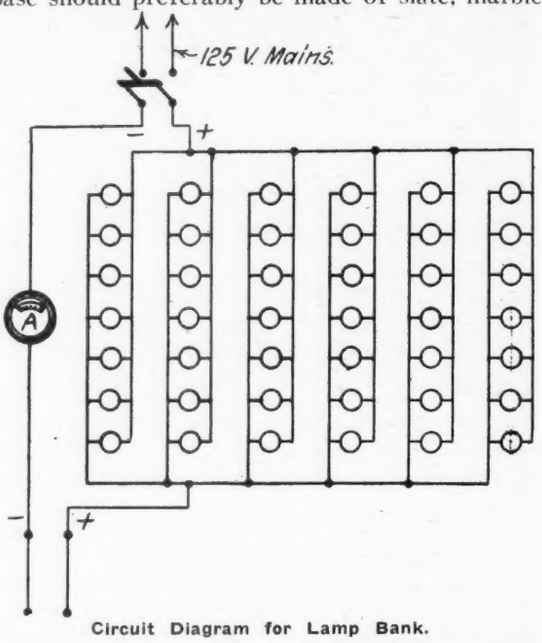


Proposed Method of Deriving Neutral for Three-Wire Circuit.

Answers.

No. 478.—Lamp Bank for Testing.—In several repair shops I recently noticed use of a lamp bank arrangement with 0-300 ammeters for testing armatures for "opens," "shorts," etc. I would like to get through the queries column a wiring diagram for such a lamp bank arrangement that it is not too complicated to make in the shop. I have tried several schemes without good results.—J. D., Detroit, Mich.

Answer.—One of the most simple and yet satisfactory lamp banks may be constructed according to the accompanying diagram. The base should preferably be made of slate, marble



Circuit Diagram for Lamp Bank.

or asbestos board, although properly filled wood may be used. The sockets or receptacles should be of the porcelain-key type. For the ordinary shop, 4 ammeters with a scale reading of 0-50 should be entirely satisfactory. Testing leads should be of a flexible nature and of sufficient length to reach any one of several jobs which may be in progress in various parts of the shop. The ends of these leads should be fitted with heavy copper or steel rods which have been pointed at the lower ends, and the joint thoroughly taped to prevent accidental shock to the user. Lamps having a carbon filament should be used on account of their taking more current than the newer types. The current may be regulated by turning on or off the proper number of lamps.—W. F. P., Atlantic, Mass.

No. 483.—Oil for Compensators.—(a) Is the oil used on railroads and known as "Signal Oil" a satisfactory oil for filling the starting compensator tank of a 10-hp., 220-volt, three-phase, 60-cycle motor? The motor always starts without load but will blow a 75-ampere fuse and I believe it even blows a 90-ampere fuse at times. One of the compensator coils burned out after about two weeks' operation, but has been repaired and is again in service with the signal oil in the tank. (b) Would you advise the use of what is known on the railroads as "Black Car Oil" for filling the compensator tank for 10 to 25-hp., 220-volt, two or three-phase motors? Which would be the most satisfactory for the above, "Black Car Oil," "Signal Oil" or "Gas Engine Oil"?—J. B., New York, N. Y.

Answer.—Some grades of signal oil will answer fairly well in any oil switch or starting

compensator, but I would not recommend the use of the other two oils. It would be better, however, to purchase oil especially made for oil switches and furnished by all large manufacturing concerns of electrical apparatus for use with starting compensators. It would cost one-third the price and be more suitable for the requirements.

However, I think the oil has nothing to do with the trouble mentioned. The fuses are either in the wrong place in the circuit or there is a wrong connection or a defective winding. The line current of a 10-hp. motor is only 26 amperes, and the highest value of current taken from the line, using the 80% tap, would be 75 amperes momentarily. That would mean that a 35-ampere fuse should be satisfactory for this condition with ordinary starting.—P. D., Bloomfield, N. J.

BOOK REVIEWS

"Controllers for Electric Motors." By Henry Duvall James. New York: D. Van Nostrand Co. Cloth, 354 pages, profusely illustrated. For sale by Electrical Review Publishing Co., Inc., for $3.

This volume consists of a series of articles originally published in the *Electric Journal* during 1917 and 1918, the object being to bring the industrial controller art before engineers, purchasers and users of electrical apparatus. This the book appears to accomplish very well, the subject being clearly treated, the text readable and well broken up by diagrams and half-tones. There are 26 chapters, dealing respectively with introduction, historical, design details, how to read controlled diagrams, methods of accelerating motors, starting characteristics of motors with different methods of control, methods of speed control and dynamic braking, direct-current magnetic contactor controllers, alternating-current controllers, resistors, protective devices, series-parallel control and the electropneumatic contactor, voltage control for direct-current motors, mine hoists, hydraulic pumps, machine tool controllers, control for machinery requiring low initial speed such as printing presses and rubber calendars, steel mill floor controllers for auxiliary drive, cranes, car dumpers, ore and coal bridges, coke, elevators, electrical equipment for oil wells, locomotives for mines and general industrial purposes.

"Principles of Transformer Design," by Alfred Still, professor of electrical design, Purdue University, Purdue, Ind. John Wiley & Sons. Cloth, 216 pages (5½ by 7¼ ins.), 67 illustrations. Supplied by Electrical Review Publishing Co., Inc., for $2.25.

This excellent little book deals exclusively with principles and practice of design. Only so much of the elementary electrical theory of the transformer is given as is deemed necessary for an understanding of the mechanical principles of design. The aim of the author is evidently to make transformer designing a rational rather than an empirical process or, perhaps it were better to say, mechanical process. In carrying out this idea he takes up the various aspects of the subject in the following order: Elementary theory, omitting all considerations likely to obscure the fundamental principles; brief descriptions of the leading types and methods of manufacture; problems connected with insulation; losses, heating, and efficiency; advanced theory, including study of magnetic leakage and voltage regulation; procedure in design; numerical examples of design; reference to special types of transformers. While it is true that an understanding of the principles involved ultimately results in a more rational design, it is also true that there is "no one method of attacking the problems of transformer design which has indisputable advantages over others; and in this as in all design the judgment and experience of the individual designer must necessarily play an important part."

That empirical formulae play an important part in transformer design is evident from an examination of the text, and necessarily so, for there are too many variables and at present imperfectly known quantities entering into the problem. This does not, however, minimize the value of this text which plainly recognizing this fact yet correlates scientific and empirical principles into a rational process. The simple and clear treatment together with the numerical examples make this a useful book both to the practical designer and the student.

C. M. JANSKY.

"School of Practical Electricity," Book No. 2. By Oscar Werwarth, Milwaukee, Wis.; Electroforce Publishing Co., Milwaukee.

The new edition of the text book series, "School of Practical Electricity," by Oscar Warwath, E. E., embodies a clear-cut exposition of this important subject set forth in an interesting and practical way. The book contains nomenclature of electrical terms, various tables covering the English and metric systems of measurement. It also deals with basic electrical units and Ohm's law. Mechanical and electrical work and energy and correlated units are covered in a separate chapter. A chapter of importance to students is one on electrical currents and of the various types such as series, multiple, etc. Other subjects handled in the book are electric meters, resistance measurements, electrical heating and the practical application of electric heating to cooking and household appliances.

"The Outlook for Research and Invention." By N. M. Hopkins. New York: D. Van Nostrand Co. Cloth, 241 pages (5 by 7½). Illustrated. Supplied by Electrical Review Publishing Co., Inc., for $2.50.

This book aims to arouse interest in research by telling of the vast need for research and the fascination that develops as research progresses. The need for such a book, and likewise for research, is ably expressed in the preface, a situation that the war brought forward with extreme urgency. It is hoped that the research started and made possible by the war will be continued and it is to encourage this that the book is written. There are eight chapters, dealing respectively with the spirit of research, men of research and their development, some indifference of the past, American war research, the education for research, some borderline limits, re-

search in the factory, the making and protecting of inventions, and appendix.

The author, Nevil Monroe Hopkins, is assistant professor, The George Washington University, and during the war was a major, Ordnance Department, Technical Research, U. S. A. The book shows him to be thoroughly familiar with the national and industrial need for research, for he tells in an immensely illuminating manner of what research accomplished during the war and how the need for industrial research still is a pressing one. The book is fascinatingly written and should appeal to anyone with the instinct for solving things. The book closes with an appendix on the subject of problems awaiting solution, pages that contain suggestions from many sources on a vast number of diversified problems. There are seven half-tones throughout the pages, portraits of famous scientists of the present day.

"Principles and Practice of Electrical Testing." By R. G. Allen, New York: Longmans, Green & Co. Cloth, 363 pages (5¾ by 8¼), profusely illustrated. For sale by Electrical Review Publishing Co. for $6.

The book is written for technical students and electrical engineers and aims to present in a single volume the principles and operations of the fundamental electrical laboratory tests, testing of circuits and machines. The results of actual tests are given in actual detail as a first guide to those that have had but limited experience in testing.

The book is divided into 16 chapters, taking up, respectively, general principles, alternating-current principles, the moving-coil galvanometer, measurement of resistance and testing insulation, testing live circuits and the location of faults, testing the magnetic qualities of iron and steel, temperature rise in electrical apparatus and machines, measurement of self and mutual inductances and capacity, principles of direct-current machines, testing direct-current machines, principles of alternating-current machines, testing alternating-current machines.

The book is well laid out for convenience in finding any subject. Chapters are subdivided by subheads that considerably assist finding what is sought. The diagrams, which are profuse, are well drawn in a bold style that helps very materially in their interpretation and significance. The book should prove of value to all concerned in the operation of electrical apparatus.

"Elements of Radiotelegraphy." By Ellery W. Stone. New York: D. Van Nostrand Co. Cloth. 267 pages (4¾x7½). Profusely illustrated, 33 plates. Supplied by Electrical Review Publishing Co., Inc., for $2.50.

This book was written primarily for the guidance and instruction of students in the communication service of the navy, and was put into written form at the request of the men under instruction. The text is largely a resume of a series of lectures by the author who holds the rank of lieutenant, U.S.N.R.F. There are eleven chapters covering the subject of radiotelegraphy from the primary principles of vibratory waves to the use and control of electricity in transmitting messages. The physical rather than the mathematical standpoint has been maintained throughout the book in an aim to clarify the subject in its presentation before students in the military branches of the government, civilian radio schools, and for the self-instruction of all similarly interested. While a knowledge of elementary physics and simple mathematics is desirable in the study of the text, it is not necessary. The 125 illustrations and diagrams, together with well chosen plates, greatly assist in an easier comprehension of the principles involved. The book closes with an appendix consisting of a bibliography of 52 sources for further study of radiotelegraphy and allied subjects.

"Electric Oscillations and Electric Waves." By George W. Pierce, Ph.D. New York: McGraw-Hill Book Co., Inc. Cloth, 517 pages (9 by 6), profusely illustrated by diagrams and charts. Supplied by Electrical Review Publishing Co., Inc., for $5.

The author has divided this book into two practically independent sections so that the reader interested in one of the title subjects more than the other may read them in either sequence. Although radiotelegraphy is the chief matter in application of the material comprising the text, the fundamental principles thus involved apply usefully in the fields of wire telephony, optics and power transmission.

Book I contains 17 chapters, the last two of which are of particular interest to the reader already well informed in the subjects of wire telephony and power transmission. Book II covers the subject of electric waves and should receive the attention of the student in optics.

Dr. Pierce, who is professor of physics in Harvard University, has accomplished a meritorious work in the compilation and technical elucidation of the principles involved in these subjects, as is shown by the detailed and comprehensive presentation of formulas and diagrams accompanying the text. The book is designed to assist from a mathematical standpoint the treatment and study of fundamentals of the theory of electric oscillations and electric waves in conjunction with laboratory work. It closes with important tables on relations of capacity-inductance product to undamped wave length and frequency of a circuit, together with squares of wave lengths; radiation resistance in ohms of flat top antenna, and conversion of units.

FLYWHEEL EFFECT FOR SYNCHRONOUS MOTORS.

The Schenectady (N. Y.) Section, American Institute of Electrical Engineers, held a meeting March 5, at which R. E. Doherty of the General Electric Co., gave an address on "Flywheel Effect for Synchronous Motors Connected to Reciprocating Compressors." Following a brief outline of the history of the application of synchronous motors to various types of load, Mr. Doherty took up the problems encountered in applying methods used in overcoming these difficulties. Various analogies illustrating the mechanical and electrical conditions of this type of drive, and examples of the effect of the natural period of the machines on the oscillation set up due to load changes were given.

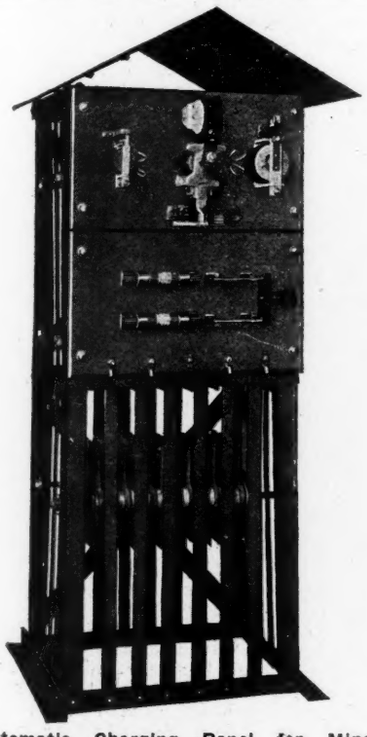
NEW APPLIANCES

Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances and Devices Now Being Placed on the Market

Battery-Charging Panel for Mine Locomotives.

For the automatic charging of mine locomotives having Edison storage batteries a new charging panel, shown in the accompanying illustration, has been designed by the Cutler-Hammer Manufacturing Co., Milwaukee and New York. It may be connected to a 250 to 275-volt d.-c. circuit, since this is the service available at most mines. The equipment consists of a slate panel supported by a floor-type mounting frame having the charging resistance self-contained. A sheet-metal roof protects the charging resistance and the magnetic switches on the panel from the mine drippings.

The switch equipment on the front of the panel consists of a main-line knife switch with renewable fuses, magnetic main-line contactor, voltage relay and shunt trip relay. The main-line contractor, which connects and disconnects the battery from the line, is controlled through the voltage relay and the shunt trip relay. The former prevents it from closing unless the line voltage is of sufficient value for charging, and causes it to open if the power fails or the line voltage drops below a predetermined value, thereby guarding against the batteries discharging back into the line. On restoration of



Automatic Charging Panel for Mine Locomotives.

the power after a power failure the main-line contactor automatically recloses, and the charge is continued. The shunt trip relay is connected to the ampere-hour meter on the locomotive and when the battery is fully charged the ampere-hour meter will energize the relay, which, in turn, causes the main-line contactor to open and disconnect the battery from the line. This relay also opens the contactor should the line voltage become too high. Thus the voltage and shunt trip relays permit charging only when normal conditions prevail on the line; that is, the supply voltage must lie between the limits for which the two relays are set.

Westinghouse White Madza Lamp.

Westinghouse Lamp Co., 165 Broadway, New York City, has developed and placed on the market its new "White Mazda" lamp for use in residences, stores and offices as well as for use in connection with 28-32-volt lighting outfits.

The "White Mazda" lamp is so named because of its milk-white, luminous bulb of peculiar opalescence, which fil-

Westinghouse "White Mazda" Lamp.

ters out of the light all objectionable glare, thus producing a more pleasing light than can be obtained by frosting the bulb of a clear lamp. Direct glare from certain surfaces, such as mirrors, polished metal or furniture and the like, may be avoided by using the new lamp, as its well diffused light is not objectionable when reflected in this manner.

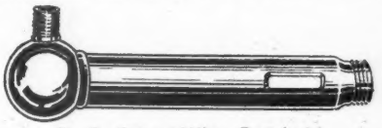
The Westinghouse "White Mazda" lamp is a 50-watt, pear-shaped lamp of the gas-filled variety and may be burned base up or base down, as well as in the horizontal position. The soft light obtained makes possible its use in exposed locations, in which, for decorative or other reasons, the use of a shade is inadvisable, as in wall brackets, in candelabra service and elsewhere.

Another feature of this new lamp is that it is made without a tip, which, particularly under frequent handling and during transportation, is liable to be broken off, causing trouble and expense.

These lamps are made only in the 50-watt size, Ps-20, tipless bulb, and in 110-125 volts for standard lighting circuits and 28-32 volts for rural lighting circuits. The retail price of the 110-volt lamp is 65 cents and that of the 28-volt lamp is 70 cents.

A One-Piece, Solid Brass Wire Bracket.

This attachment gives in one device the service formerly secured only by assembling a number of separate, individual attachments. It is one of the latest appliances in the E-Z Wire Electrical device line of fixtures man-



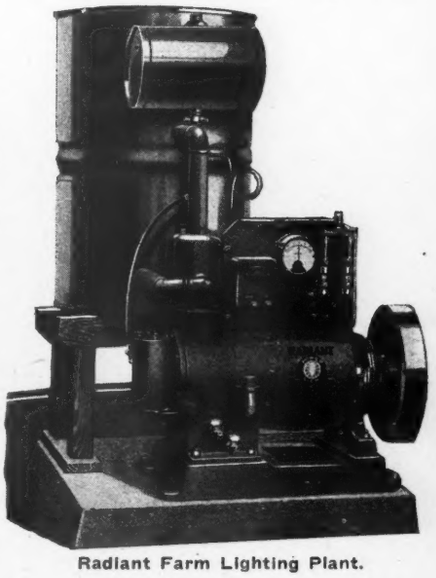
E. Z. Brass Wire Bracket.

ufactured by the Peerless Light Company, Halsted, Adams and Green streets, Chicago.

It is claimed that this appliance effects a saving in time and labor and affords much greater ease in wiring. Those who speak from experience in hanging fixtures know the vexing delays in case the iron body is too long. All this, it appears, is remedied in this one-piece device.

Radiant Company Develops New Farm-lighting Plant.

A farm-lighting plant that will sell for a low figure is the latest device of the Radiant Manufacturing Co., Sandusky, O. The new plant is equipped with standard Willard storage batter-



Radiant Farm Lighting Plant.

ies, complete with switchboards and instruments. The standard 4-cycle engine used is direct-connected to the generator shaft with special counterbalanced drop-forged crank, all enclosed in a dust-proof case. The plant occupies a space of 18 by 22 by 27½ ins. and weighs less than 200 lbs.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Moloney Electric Co., St. Louis, Mo., has opened a branch office in Buffalo at 451 Ellicott Square building with J. Leo Scanlon in charge,. Mr. Scanlon formerly traveled through Iowa and adjacent territory for the Moloney Company.

Buffalo Forge Co. directors recently appointed officers as follows: Henry W. Wendt, president; Edgar F. Wendt, vice-president and treasurer; Henry W. Wendt, Jr., vice-president and secretary; C. A. Booth, vice-president and sales manager. The directors include the above officers and H. S. Whiting.

Sprague Electric Works, of General Electric Co., 527 West 34th street, New York City, has issued a new booklet, B-3526, describing the motor-driven ventilating fans manufactured by the company. Details of the Davidson, the Sprague-Davidson and the Sprague-Ventura fans are given in the booklet.

Northern Equipment Co., Erie, Pa., manufacturer of the well-known Copes feed-water regulators, has issued a valuable little book on the subject of "Saving Fuel Automatically and Scientifically in the Boiler Room." This is a little book of exceptional interest because the subject dealt with is a timely one present at all times of plant operation.

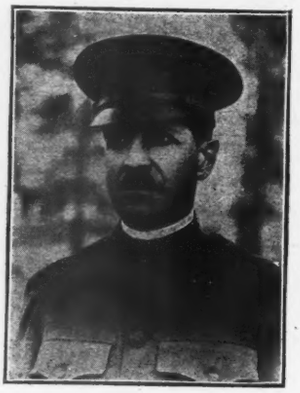
Bodine Electric Co., 2256 West Ohio street, Chicago, in *The Motorgram,* a publication devoted to Bodine motors, has an interesting little article on "A Science That Honors Its Discoverers—The Romance of Electrical Units" in which the derivation of the words "ohm," "ampere," "volt," and other electrical units of measurement are given.

American Steam Conveyor Corp., 326 West Madison street, Chicago, announces that arrangements have been made with the Wellman, Bibby Co., Ltd., 36 Kingsway, London, Eng., to act as its representative for the sale of the American steam ash conveyor in Great Britain and Ireland. The Wellman Bibby Co. will manufacture the conveyor in England.

Mono Corporation of America, 48 Coal & Iron exchange, Buffalo, N. Y., has purchased the entire stock of Mono apparatus and accessories from the F. D. Harger Co., Buffalo, N. Y. The deal includes all rights for the manufacture and sale of the various types of Mono apparatus for the automatic analysis of CO_2, CO, O_2, H_2, SO_2, N_2, Cl., etc. F. D. Harger, mechanical engineer, will serve as general manager of the new corporation.

B. F. Sturtevant Co., Hyde Park, Boston, Mass., manufacturer of electrical apparatus, is sending to the trade catalog No. 264, a 60-page, well illustrated brochure, giving details and pictures of the various types of motors, generators, steam engine generating sets, steam turbine generating sets, gasoline engine generating sets, electric propellor fans, electric air heaters, electrical apparatus for special applications and other devices manufactured by the company.

Mitchell-Rand Manufacturing Co., New York City, manufacturer of electrical insulating materials, has elected Joseph H. Lecour treasurer. He succeeds W. E. G. Mitchell, who in the future will give all his attention to his duties as vice-president. Mr. Lecour is well known in the electrical industry. He was graduated from Trinity College, New York City, in 1898, and from the New York Law School in 1900. He was on the staff of the First American



Joseph H. Lecour.

army in overseas service in September, 1917, and as a member of the 124th field artillery served in the Argonne-Meuse offensive.

Advertising Engineers, 180 North Market street, Chicago, and 50 Union square, New York City, announce the opening of offices for the purpose of specializing in technical advertising. Advertising Engineers is a group of technically-trained men who have devoted their efforts to merchandising technical products and are ready to furnish advice or conduct all kinds of publicity and selling campaigns.

Apex Electrical Distributing Co., Cleveland, O., holds a get-together banquet and jubilee once a month for nearly 40 department heads of the company, at which ideas for the betterment of the system are brought out, as well as an evening's entertainment enjoyed. Many new men are constantly being added to the Apex organization and the dinner meetings aid them in getting acquainted with the company's policies.

Aids Fan Advertising Campaign.—As a means of aiding retailers in properly advertising electric fans the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has just put out a classy booklet with the apt title "Start It Going—Keep It Blowing." The booklet not only tells dealers the best way to attract attention to Westinghouse fans but also gives samples of cuts and layouts for advertisements that the company will furnish the dealer on request.

Rome Wire Co., Rome, N. Y., recently authorized an increase in the capital stock of the company to $4,000,000 of 7% first preferred stock and $5,650,000 common stock, the shares in each issue to be $100 par value. Kidder, Peabody & Co., New York and Boston, are offering the public $1,400,000 of the preferred issue. The company's main plant at Rome, N. Y., consists of 22 acres of land with buildings covering 348,000 sq. ft. At Buffalo the company occupies 11 acres of land with buildings adapted to the manufacture of electrical wires and cables.

Beardslee Chandelier Manufacturing Co., 216 South Jefferson street, Chicago, manufacturer of "Denzar" lamps, called by the manufacturer "The Unit of Day Brightness," has issued a 16-page catalog with 3-color cover and a 2-color envelope folder telling of the "Denzar" lamps. The "Denzar" lighting unit is made in several styles, type and sizes to meet the requirements of stores, offices, schools, halls and public buildings. The manufacturer claims it gives a light of sunlike radiance, free from glare and harsh shadows.

Syracuse Washing Machine Corp., Syracuse, N. Y., recently reorganized, has made Raymond Marsh advertising and sales manager of the company. Mr. Marsh was largely instrumental four years ago in the organization of the American Washing Machine Manufacturers' Association and has been its secretary since its inception. The Syracuse Washer Corp., was organized in July, 1917, to manufacture the "Easy" vacuum electric washing machine, and due to rapid growth was recently reorganized, as the Syracuse Washing Machine Corp., and is now building a new fireproof plant on a 25-acre tract at Syracuse, which will be occupied next fall.

William B. Durgin Co., Concord, N. H., has issued a booklet describing the Crawford induction motors, which the Durgin company plans to turn out in larger numbers than in the past. For several years all motors used by the Durgin company in its silverware manufacturing work have been made by the company, which will now expand and sell its product to outsiders. A large plant has been taken over at Concord. The plant will be in charge of Clarence R. Blanchard as manager and John J. Crawford, builder of the Crawford motor, as superintendent. This motor, so constructed as to handle overloads in emergencies, yet designed for long life and ease in care and maintenance, so the company claims, is built from top to bottom at the Concord plant.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

A. H. AMBROSE has been appointed advertising manager of the Radiant Manufacturing Co., Sandusky, O., manufacturer of light and power plants. For the past eight years Mr. Ambrose has been assistant advertising and sales

A. H. Ambrose.

promotion manager of the Associated Manufacturers' Co., Waterloo, Ia., and was responsible for the sales and publicity work which made the "Jerry Boy" handcar known all over the country. He has also had wide experience in the manufacture and sale of farm-lighting plants.

WILLIAM A. HEINDLE, general superintendent of the Wilmington & Philadelphia Traction Co., Wilmington, Del., has resigned, effective April 1.

A. S. MCCORDICK, who for several years has been connected with the Canadian General Electric Co., has severed that connection, and is now sales manager with the Moloney Electric Co. of Canada, Ltd.

JOSEPH MCKINLEY, Pittsburgh, Pa., manager of the power sales of the Duquesne Light Co. of that city, has been appointed general contracting agent, effective March 1, to succeed Henry Harris, resigned.

H. M. SLITER, for the past seven years manager of the Elmira district office of the General Electric Co., has been made sales manager of the Mohawk Electrical Supply Co., Syracuse, N. Y. J. J. McGuire has been made assistant sales manager.

HARRY C. STEVENSON, Newark, N. J., who has been assistant to vice-president Edmund W. Wakelee, of the Public Service Corp., for a number of years, has been appointed personal representative to President Thomas N. McCarter, with offices at 418 Federal street, Camden.

A. A. VESCELIUS has been appointed district commercial manager of the New York Telephone Co., with offices in Newark, N. J., to succeed Edmund W. Wollmuth, resigned. Mr. Vescelius has been local commercial manager at the Morristown, N. J., offices of the company.

JOHN L. MERRILL, president of the All-America Cables, New York, was tendered a testimonial dinner at the Hotel Astor by heads of the departments of the company, on February 24, in recognition of the 36th anniversary of his connection with the company.

W. D. WARD has been appointed manager of the Atlantic department of the Pelton Water Wheel Co., San Francisco, Cal., hydraulic engineers, and will open offices at 90 West street, New York City. Mr. Ward has been associated with the Pelton Water Wheel Co. for more than 25 years and was ranking sales engineer in the San Francisco office prior to his appointment to New York.

GERARD SWOPE, president of the International General Electric Co. and former vice-president of the Western Electric Co., has been awarded the distinguished service medal by President Wilson for his services as one of the principal advisers and assistants to the director of purchase, storage and traffic during the world war. In this position Mr. Swope accomplished the task of working out the detailed plan for bringing under one head the direction and supervision of procurement, storage and issue of all commodities and articles of equipment and supply needed for the army.

CALVERT TOWNLEY, assistant to president of the Westinghouse Electric & Manufacturing Company, was re-elected vice-president of the United Engineering Society for the year ending January 1921. Mr. Townley was born in Cincinnati, O., where he prepared himself for entrance into Yale College, where the mechanical engineer's degree was conferred upon him in 1888. In 1887 Mr. Townley became connected with the Westinghouse company, serving with the organization seventeen years successively at Cincinnati, Pittsburgh, Boston and New York. At the end of this period, 1904, he resigned and for seven years was engaged in executive railway work. After renewing his connections with the Westinghouse company in 1911, he became assistant to president, supervising many of the company's indirectly related activities. He resides in New York City and is a member of the Engineers, Yale, Automobile, Scardale, Railroad and Bankers Clubs.

LAWRENCE W. DAVIS has been appointed special representative of the National Association of Electrical Contractors and Dealers and will travel throughout the country in the interests of the association.

HOWARD W. FAIRLIE has been appointed sales manager of the Monarch Electric Co., Ltd., Montreal, Que. For the past eight years Mr. Fairlie has been connected with the Northern Electric Co. devoting his time to sales work.

O. M. BOOHER, contracting agent of the Indiana Railways & Light Co., Kokomo, Ind., has been named by Gov. James P. Goodrich, of Indiana, as a member of the State Commission to select a suitable memorial for the Indiana soldiers who lost their lives in the world war. Mr. Booher was active in war work, having been chairman of Liberty and Victory loan drives in his district.

JOHN G. FELTON has succeeded C. B. Yonts as manager of the Wisconsin-Minnesota Light & Power Co. at La Crosse, Wis. Mr. Felton was formerly manager of the Charleston, S. C., gas and electric interests.

JOHN J. EYRE has become consulting engineer of the Simplex Wire & Cable Co., Cambridge, Mass. He was formerly factory engineer with the Sturtevant Aeroplane Co., Boston.

N. H. BOYNTON, general manager of the Buckeye Electric Division of the National Lamp Works, was elected a director of the Cleveland Trust Co. at a stockholders' meeting, February 18.

N. H. Boynton.

Prior to taking up his present work two years ago Mr. Boynton was manager of the publicity department of the National Lamp Works for six years.

S. L. NICHOLSON, vice president of the Westinghouse Agent-Jobbers' Association, first president of the American Association of Electric Motor Manufacturers, and member of the National Industrial Conference Board, representing the electrical industry has

S. L. Nicholson.

many achievements to his credit in the great onward march of scientific commercial progression. Prominent among these is his recent successful work at Washington, D. C., where he efficiently co-operated with the government in solving equipment problems during the world war. He became affiliated with the Westinghouse Electric & Manufacturing Co. as engineering salesman at the New York office in 1898. In February, 1904, when the industrial and power department was formed Mr. Nicholson was transferred to East Pittsburgh as manager of that department. In 1909 Mr. Nicholson was appointed sales manager of the company. When he first become connected with the sales force it consisted of approximately 65 employees. When he was appointed assistant to Vice-President L. A. Osborne, in 1917, the sales force included over 1500 people. Mr. Nicholson is a member of the Electrical Manufacturers' Club, Engineers' Club, Bankers' Club, Pittsburgh Athletic Association, Pittsburgh Field Club, and the Philadelphia Art Club. He is also a fellow of the American Institute of Electrical Engineers, and a member of the Society of the Sons of the American Revolution.

DR. CHARLES WARREN HUNT, following a service of 25 years as secretary of the American Society of Civil Engineers, has been made secretary emeritus at a salary of $9000 and has been granted a six months' leave of absence to enable him to recuperate his health.

HOWARD M. TURNER, recently with the Turner Falls, (Mass.) Power & Electric Co., has been appointed lecturer on water-power engineering at the Harvard Engineering School, Cambridge, Mass.

CARL A. JOHNSON, president Gisholt Machine Co., Madison, Wis., was re-elected president of the Wisconsin Manufacturers' Association at the recent annual meeting held in Milwaukee. George F. Kull, Milwaukee, was re-elected secretary.

A. W. RANSOME, formerly manager of the New England territory for Blaw-Knox Co., with offices at Boston, has been transferred to San Francisco in the capacity of manager of the Pacific coast territory, with offices in the Monadnock building, San Francisco. Mr. Ransome was born in San Francisco and is a graduate of the University of California, Class of 1897. He played fullback on the university team for 4 years, captaining the team of 1896. Immediately after leaving college he became engaged in construction work and in the construction machinery business up until 1917, when he became associated with the Blaw-Knox Co.

W. S. RUGG, manager of the railway and marine departments and CHARLES ROBBINS, assistant sales manager of the Westinghouse Electric & Manufacturing Co., have been promoted to assistants to vice-president of the company. Mr. Rugg was born at Broadhead, Mich., and is a graduate of Cornell University. His connection with the Westinghouse company dates back to the earlier days of its growth. Soon after his connection with the organization he was transferred from Pittsburgh to Chicago and in 1901 he was transferred to New York as special engineer, where eight years later he was made the manager of the New York office. In 1917 he was recalled to East Pittsburgh to take charge of the railway department and in 1918 he was also made manager of the newly created marine department. Mr. Robbins began his connection with the company in 1899 at its New York office. He was transferred in 1906 to the main offices at East Pittsburgh assistant to manager of the industrial and power departments. He retained this position until his appointment to the position of manager of the industrial sales department in 1910. In August, 1915, he was made assistant sales manager of the company, from

W. S. Rugg.

which he was promoted to his present position. MYLES B. LAMBERT, for many years actively connected with the work of the Westinghouse company, succeeds Mr. Rugg as manager of the railway department. In 1901 Mr. Lambert joined the Westinghouse forces and since that time he has occupied several positions in the railway department. The last one, previous to his promotion, was that of assistant to manager.

E. A. PRINTZ, formerly district sales manager of the Chicago district of the Square D Co., Detroit, has been made sales manager of the company, the appointment becoming effective Feb. 1. Mr. Printz succeeds A. MACLACHLAN, who continues as secre-

E. A. Printz.

tary and director of distribution of the company. Other additions and changes in the sales and advertising departments are as follows: D. M. STONE, formerly district sales manager of the Pittsburgh territory, was made district sales manager of the Detroit territory. J. A. JACQUES, formerly in charge of the New York territory as district sales manager, was given the district sales managership of the Pittsburgh territory, and H. W. SPAHN, district sales manager of the Buffalo territory, was placed in charge of New York. D. H. COLCORD, formerly of the department of publicity of the Westinghouse Air Brake Co., Pittsburgh, was appointed director of research engineering. The annual sales conference of the Square D Co. was held at the Hotel Statler, Detroit, Feb. 16, 17 and 18.

OBITUARY.

CHARLES B. HOPKINS, pioneer telephone man and a resident of the northwest since boyhood, died Feb. 4 at the Mayo hospital, Rochester, Minn. He was born in San Francisco in 1855 but early in life moved to the state of Washington, where since 1883 he has been interested in the telephone business.

JOHN SOUTHWORTH ROUNTREE, general manager of the Edison Electrical Appliance Co., Chicago, died of pneumonia in New York City on March 4, while in that city on a business trip. Mr. Rountree was a graduate of Ripon College and the University of Michigan and a member of the University. Union League and City Clubs of Chicago.

A. H. ROGERS, president of the Southwest Missouri Railroad Co., Carthage, Mo., well-known in interurban circles, died March 6 at Los Angeles, Cal. He was 65 years of age. Mr. Rogers, besides being the head of the interurban company, was president of the Joplin Globe Publishing Co.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Fitzdale, Vt.—Fitzdale Paper Co. has inaugurated work on the construction of a large new 1-story brick power plant, to be used for general works operation. The structure, with equipment installation, is estimated to cost about $100,000. J. F. King is treasurer. The C. A. Conrad Construction Co., Fitzdale, is the contractor.

Cambridge, Mass.—New England Telephone & Telegraph Co., 50 Oliver street, Boston, is making rapid progress on the construction of the new addition to its telephone exchange plant on Inman street, Cambridge. The structure will be 2-story, about 35 by 35 ft., and is estimated to cost about $70,000.

Framingham, Mass.—Considerable electrical and mechanical equipment will be utilized in connection with the construction of the proposed new 3-story addition to the plant of the Roxbury Carpet Co., located in the Saxonville district. The structure will be about 100 by 160 ft.

Hillsgrove, R. I.—The R. I. Malleable Iron Works have recently awarded a contract to the Whalen Electric Co., 25 High street, Pawtucket, for the installation of new electric motors at their plant.

Providence, R. I. — Narragansett Electric Lighting Co. is understood to have completed plans for the erection of a large new addition to its power station on South street. The proposed new extension will be of brick and steel, about 76 by 94 ft., and is estimated to cost in excess of $700,000, including machinery and equipment installation.

New Haven, Conn.—Model Laundry Co., located in the City Point district, is arranging for extensive enlargement of its plant, for increased operations. The work includes the erection of a new addition to the plant proper, boiler plant, and addition to garage for company cars. It is understood that new laundry machinery will be required in connection with the work. Richard Williams, New Haven, is architect.

Batavia, N. Y.—Common Council has awarded a contract to the Gamewell Fire Alarm Telephone Co., New York City, for the installation of a new signal system for the police department. It is expected that the work will be completed in about four months.

Batavia, N. Y.—Genesee Light & Power Co. has been granted permission by the Public Service Commission, Albany, to construct and operate its proposed new plant at Byron, Genesee County. The company has been granted a franchise by the municipal authorities. Walter C. Lewis is president and treasurer.

Berkshire, N. Y.—Delco Lighting Co. has had plans prepared for the construction of a new local electric lighting plant. The company has been granted permission by the Public Service Commission, Albany, to proceed with this construction work, as well as to issue stock for $6000.

Binghamton, N. Y.—State Hospital Commission, E. S. Elwood, secretary, has awarded a contract to the Troy Laundry Machinery Co., Ltd., 133 Centre street, New York, for the furnishing of new laundry equipment for installation at the Binghamton State hospital. The machinery is estimated to cost about $11,000.

Binghamton, N. Y. — Binghamton Light, Heat & Power Co. is completing arrangements for the installation of a quantity of new equipment at its plant for increased operation. The work includes a new 5000 kw. turbine unit, and the company has awarded contracts for two additional boilers with stokers and auxiliary apparatus.

Brooklyn, N. Y.—Paul M. Marko & Co., Atlantic avenue, between Nostrand and New York avenues, manufacturers of storage batteries, have had plans prepared for the erection of a new addition to their plant for increased operations, as well as alterations and improvements in the existing structure, to cost about $10,000.

Buffalo, N. Y.—Beck Brewing Co. is understood to be arranging plans for the converting of its plant at North Division and Spring streets into a cold storage plant. The structure comprises a floor area of about 800,000 cubic feet, and considerable electrical equipment and refrigerating apparatus will be required.

Geneseo, N. Y.—Work has been completed on the consolidation of the local systems of the Federal and Bell Telephone companies.

Gloversville, N. Y.—Kingsboro Silk Mills have had plans prepared for the construction of a new 3-story factory and boiler plant addition to their works. The structure will be about 40 by 100 ft., and is estimated to cost $20,000.

Jamestown, N. Y.—City has approved the issuance of bonds for $250,000, the proceeds to be used for additions to the municipal electric lighting plant for increased operations. The project is in charge of the Board of Water & Lighting Commissioners.

New York, N. Y.—New York Edison Co., Irving place and 15th street, has been awarded a contract for the furnishing of electric energy for the large 13-story garment factory of the International Tailoring Co., to be located at 4th avenue and 13th street. A total of 5000 lamps will be utilized and 217 hp. required.

New York, N. Y.—Kimball Electric Co. has completed negotiations for the leasing of property at 23 West 27th street, for a new establishment.

New York, N. Y.—Phoenix Motor Co. has filed notice with the Secretary of State of an increase in its capital to $20,000 for general business expansion.

New York, N. Y.—Pacent Electric Co. has filed notice with the Secretary of State of an increase in its capital from $10,000 to $15,000, to provide for general business expansion.

New York, N. Y.—United Electric Finance Corp., a Delaware incorporation, has filed notice with the Secretary of State of an increase in its capital from $500,000 to $5,000,000, for general business expansion.

New York, N. Y.—New York Telephone Co., 15 Dey street, has completed negotiations for the purchase of property, about 25 by 50 feet, on 175th street, near St. Nicholas avenue.

New York, N. Y.—Waite & Bartlett Manufacturing Co., 252 West 29th street, manufacturer of electrical equipment, is understood to be arranging for the establishment of a new 5-story plant at Long Island City. A building of this size at Jackson avenue and 5th street will be remodeled for the new works.

North Tonawanda, N. Y.—Tonawanda Power Co. has filed notice with the Secretary of State of an increase in its capitalization from $750,000 to $2,000,000, to provide for general business expansion.

Schenectady, N. Y.—General Electric Co. has made extensive purchases of new machinery and equipment to its works at Hudson and Lynn, Mass., and is planning for the acquirement of considerable other apparatus and equipment for its works at Newark and Harrison, N. J. It is understood that a list of equipment is new being made out for the Harrison Lamp works, known as the Edison Lamp works of the General Electric Co.

Seneca Falls, N. Y.—Due to the burning of a large turbine generator at the power plant of the Tracey Development Co. at Waterloo, power operations were seriously curtailed recently. The company is arranging for immediate repairs.

Belleville, N. J.—Considerable electrical equipment, including motors for individual drive, etc., will be required in connection with the construction of the proposed new 2-story plant of the Sweeney Lithograph Co., 251 West 19th street, New York City, to be located on Cortland street, Belleville, N. J., estimated to cost $65,000.

Midland Township, N. J.—Considerable electrical equipment will be re-

quired by the board of Chosen Freeholders of Bergen County, E. B. Gorham, chairman of the Institution Committee, in connection with the construction of the proposed new hospital buildings at Midland Township, estimated to cost about $500,000. The structures will comprise two tubercular and one isolation hospital building, and plans have been prepared.

Newark, N. J.—Charles Maybaum, who recently completed negotiations for the acquirement of the plant at Stockton street and Wilson avenue, used for meat packing, etc., is having plans prepared for the construction of a new boiler plant and rendering works to be used in connection with the abattoir.

Newark, N. J.—Home Electric Service Co. has filed notice of organization to operate at 422 Orange street in a general electrical engineering capacity. Philip J. Rugg, 113 Chestnut street, heads the company.

Summit, N. J.—Common Council is understood to be considering plans for the construction of a new pumping plant to be used in connection with its sewage-disposal works. Electrically-operated machinery will be utilized.

Summit, N. J.—Commonwealth Electric Co. is considering plans for the construction of a new addition to its plant.

Trenton, N. J.—Prof. C. E. Clewell, University of Pennsylvania, expert in city lighting, has inaugurated preliminary investigations in connection with the proposed improvements in the electric street-lighting system.

Union Hill, N. J.—Consumers Hygienic Ice Co., 420 Fulton street, is taking bids for the construction of its proposed new 2-story ice manufacturing plant, about 85 by 99 ft., to be located at 4020 Fulton street. The structure is estimated to cost $45,000, and considerable refrigerating equipment will be required.

Allentown, Pa.—Lehigh Valley Light & Power Co., operated by the Electric Bond & Share Co., 71 Broadway, New York, will soon commence the construction of its proposed new steam-operated generating plant in the vicinity of Hauto, Pa. The structure, with equipment, is estimated to cost close to $3,000,000, and the work will be carried out by the Phoenix Utility Co., a subsidiary company. Negotiations are under way for the purchase of one or more existing electric plants in the Sunbury district by the Lehigh company, to provide increased generating facilities in this territory.

Altoona, Pa.—Considerable electrical and refrigerating equipment will be required in connection with the construction of the proposed new 2 and 3-story and basement ice cream manufacturing plant to be erected by the Hoffman Brothers Co. The structure will be about 50 by 125 ft., located at 9th and Green streets, and is estimated to cost $125,000.

Dallastown, Pa.—Council has recently awarded a contract to the Edison Light & Power Co. for furnishing electric service for municipal use.

Hazleton, Pa.—Louis Roessell & Co. have awarded a contract for the construction of a new 1-story brick power plant for works operation. The structure will be about 40 by 70 ft. George S. Wardle, Frankford, Philadelphia, is the contractor.

McKees Rocks, Pa.—Common Council is having plans prepared for the installation of a new electrically operated fire alarm system for municipal service.

Philadelphia, Pa.—General Electric Co. is said to be arranging plans for the construction of a large new plant in the southwestern section of Philadelphia to occupy a total of two city blocks on Elmwood avenue, from 68th to 70th streets. The proposed works will be erected on the unit plan, and will comprise five large manufacturing buildings, power plant for general factory operations, and auxiliary structures, and will afford employment to from 5000 to 8000 persons. The project is estimated to cost in excess of $5,000,000.

Philadelphia, Pa. — Brown Instrument Co., Wayne and Windrim streets, manufacturer of pyrometers and other scientific instruments, has has plans prepared for the construction of a new 2-story plant, about 37 by 72 ft., to be located at Wayne and Roberts streets. The structure is estimated to cost about $22,000. The company has also awarded a contract to R. C. Ballinger & Co., 218 North 13th street, for the construction of a new 2-story concrete works unit at this location, about 44 by 126 ft., estimated to cost $35,000.

Philadelphia, Pa. — Considerable electrical and mechanical equipment will be required in connection with the construction of the new building at Juniper and Arch streets for the *Philadelphia Evening Bulletin*. Doyle & Co., 1519 Sansom street, are the contractors.

Philadelphia, Pa.—Bell Telephone Co. has awarded a contract to F. L. Hoover & Sons, Philadelphia, for alterations and improvements in its administration building at 17th and Arch streets, to cost about $7000.

Pittsburgh, Pa.—Hill Top Ice Co. is making rapid progress on the construction of a new 1-story addition to its ice manufacturing plant, about 20 by 80 ft., on Mathews avenue. It is understood that new refrigerating apparatus will be installed.

Pittsburgh, Pa. — Westinghouse Electric & Manufacturing Co. has awarded a contract to Westinghouse, Church, Kerr & Co., Wall street, New York, for the construction of four new plant units at its works at Lester, Pa. The structures will include 1-story light machine shop, 130 by 500 ft., to be used for the production of small turbines for operating pumps and generators; extension of the erecting shop by about 300 ft.; machine shop, about 130 by 750 ft., which will be a duplicate of present machine shop No. 1, to be used for the manufacture of large land and sea steam turbines and machining; as well as 3-story structure, a portion of which will be used for manufacturing, while another section will be for warehousing purposes.

Pittsburgh, Pa.—Board of Trustees of the University of Pittsburgh has inaugurated operations in its wireless telegraph station, following the receipt of Government permission from Washington. During the war, all university wireless stations were closed.

Wormleysburg, Pa. — Bell Telephone Co. has had plans prepared for the installation of new underground conduit system throughout the municipality, to replace the present overhead wires. The company's plans have been approved by the Public Service Commission.

Baltimore, Md.—Consolidated Gas, Electric Light & Power Co. has awarded a contract to the Patapsco Iron Works, Inc., for the construction of the proposed new gas house to be located in the Spring Garden district.

Baltimore, Md.—Board of Trustees of Johns Hopkins hospital has had plans prepared for the installation of a new heating and lighting plant estimated to cost about $20,000, to be used in connection with the construction of a new 7-story addition at the institution. The Price Construction Co., 210 Maryland Trust building, is the contractor.

Cumberland, Md.—Fire, on February 29, destroyed the plant of the Wellington Glass Co., manufacturer of lighting fixtures, and other glass specialties, with loss estimated at about $350,000.

Elkton, Md.—Oxford Electric Light Co. has completed negotiations for the purchase of the Tome Institute electric light plant at Port Deposit, Md. The new owner is planning for the continued operation of the plant. The company is also arranging plans for the construction of a new power line from Oxford to Rising Sun, for increased power facilities.

Washington, D. C.—Potomac Electric Power Co. has completed plans for the immediate erection of a new power station at 510 10th street, northwest, to be used for furnishing electric energy for lighting and power in the downtown district.

Front Royal, Va.—Shenandoah Valley Milling Co. is making rapid progress on the construction of a new power plant at its works.

Berkeley Springs, W. Va. — Interwoven Mills, New Brunswick, N. J., is arranging plans for the immediate construction of a new local branch manufacturing plant, to be devoted to the production of cotton hosiery. The plans provide for a capacity of about 1000 dozen pairs of hose daily, and employment will be afforded for about 150 operatives. Considerable electrical equipment, including motors for individual drive, will be required.

Millville, W. Va. — Northern Virginia Power Co., Winchester, Va., has commenced the installation of a new 6000 kw. unit at its power station at Millville, located on the Shenandoah river, for increased operations. The company will also install a new 750-hp. capacity boiler unit at its plant at Security, Md.

Belmont, N. C.—Considerable elec-

trical equipment, including motors for individual drive, will be required in connection with the proposed new cotton-yarn manufacturing plant of the Stowe Spinning Co., recently incorporated with a capital of $1,800,000.

NORTH CENTRAL STATES.

Cincinnati, O.—Cincinnati Gas & Electric Co. has completed arrangements for a note issue for $2,400,000, a portion of the proceeds to be used for extensions and improvements. At the present time the company is installing and equipping a third plant unit of 30,000 kw. for increased operations. Charles D. Jones is president.

Cleveland, O.—Fire on March 1 destroyed the 4-story brick building of the A. & W. Electric Sign Co., West 3rd street and Prospect avenue, with loss estimated at about $125,000.

Youngstown, O.—The Pennsylvania-Ohio Electric Co., formerly the Mahoning & Shenango Railway & Light Co., will build an addition this spring to its Lowellville power house, to house another 20,000 hp. unit, with additional boilers and other auxiliary equipment. This will increase plant capacity to 80,000 hp. and provide additional power facilities for the industrial growth of the Youngstown, New Castle and Sharon districts.

Evansville, Ind.—Southern Telephone Co. of Indiana will expend $75,000 in improvements this summer.

Hammond, Ind.—The Hammond Hotel and Improvement Co., composed of Chicago and Hammond interests, will erect a 9-story theater and hotel, costing $900,000.

Indianapolis, Ind.—The Indiana Public Service Commission has authorized the Orleans Electric Light and Power Co. and the Orleans Water Co. to sell and transfer their properties to the Orange County Public Service Co.

Indianapolis, Ind. — Indianapolis Electric Supply Co. has increased its capital stock from $150,000 to $300,000.

Kokomo, Ind.—The International Engineering and Manufacturing Co., an Illinois corporation, will establish a $100,000 plant here to manufacture electric lighting power plants for farm homes and farm purposes.

Kokomo, Ind.—The Indiana Public Service Commission has authorized the American Telephone and Telegraph Co. to acquire and hold all or any part of the outstanding capital stock of the Citizens' Telephone Co. of Kokomo, Ind., the Indiana Union Telephone and Telegraph Co., of Fowler, Ind., the United Telephone Co., of Bluffton, Ind., and the Southern Telephone Co., of Indiana.

Shelbyville, Ind.—The Interstate Public Service Co., owner of the electric power plant in this city and at Franklin, Ind., has asked the Indiana Public Service Commission for permission to construct a transmission line from Shelbyville to the Shelby-Johnson county line, where it will connect with a line to be extended from Franklin. Surplus power will be available for both Shelbyville and Franklin in this way.

Terre Haute, Ind.—Hoosier Rolling Mill Co. proposes to erect $2,000,000 steel plant in this city.

Winchester, Ind.—The Winchester Heat, Light and Power Co. has made a contract with the authorities of Fountain City, Ind., to extend its electric light lines to that town and supply electric current. The lines run through Lynn and will be rebuilt to carry the added current. The company is arranging to put in a 500 hp. engine in Winchester.

Lansing, Mich.—City will have a $1,500,000 municipal power plant according to a resolution recently adopted by the City Council. In addition there is to be an expenditure of $140,000 for extensions to and maintenance of the city's two power plants.

Moline, Ill.—A joint petition has been filed with the Illinois Public Utilities Commission to authorize the Peoples Power Co. of Rock Island to sell electrical energy to the Coe Light and Power Co. in Port Byron and Coe townships and for the joint use of the poles of the Peoples Power Co. by the Coe Light and Power Co.

Moline, Ill.—A. P. Berzelius and associates will erect new apartment building, 5 stories in height, to cost $400,000, to contain between 25 and 30 suites.

Paris, Ill.—The Lake Engineering Co. of Chicago has been retained by the city for the engineering work in connection with the proposed whiteway improvement consisting of 130 pedestal lights.

Sherrard, Ill.—Sherrard Electric Light Co. is seeking permission to extend its lines from Orion to Lynn and Osco.

Marinette, Wis.—Montana Tractor Co. of Tinley Park, Ill., will locate its plant at Peshtigo, near this city. A site has been selected and a steel and brick building, 175 by 250 ft., to cost $40,000, will be erected.

Milwaukee, Wis. — Westinghouse Lamp Co., 165 Broadway, New York City, is arranging plans for the construction of a new addition to its plant at Milwaukee, Wis. The structure, including equipment installation, is estimated to cost $400,000. Stone & Webster, 120 Broadway, New York City, are engineers for the company.

Minneapolis, Minn.—Montgomery Ward & Co., Chicago, will erect an 8-story building, with 750,000 sq. ft. of floor space, to cost $2,750,000. A duplicate of this building will be erected at Portland, Ore.

Carroll, Ia.—Consumers Electrical Co., a Delaware incorporation, has filed notice with the Secretary of State of an increase in its capital from $50,000 to $150,000.

Davenport, Ia.—Warnerlite Products Co. will expend $350,000 for site and buildings this season.

Kansas City, Mo.—Kansas City Power and Light Co. will expend $250,000 for a new warehouse building, a company garage and for storage space. The company has just acquired a tract of land 265 by 450 ft. immediately south of the Kansas City Terminal tracks on Summit street.

Kansas City, Mo.—F. C. Merry and C. N. Shelden will erect a 5-story building, 50 by 117 ft., to cost $150,000, for district offices of B. F. Goodrich Rubber Co.

Lathrop, Mo.—Lathrop Light, Heat & Power Co. has had plans prepared for the construction of a new local transformer station, estimated to cost about $15,000. E. S. Grant is secretary-treasurer.

Leadwood, Mo.—St. Joseph Lead Co., 61 Broadway, New York City, has awarded a contract to Stone & Webster, 120 Broadway, New York City, for the construction of a new 1-story reinforced concrete power plant at its local works.

Unionville, Mo.—Board of Public Works is considering plans for the installation of new electric street-lighting system, as well as the rebuilding of the municipal electric lines. It is also proposed to install new boiler equipment at the municipal plant. M. Flynn is superintendent.

Windsor, Mo.—Windsor Light & Power Co. is having plans prepared for extensions and improvements in its electric transmission lines. It is also proposed to change its plant to alternating current operation. R. F. Williams is secretary and manager.

SOUTH CENTRAL STATES.

Whitesburg, Ky. — Arrangements are being made by H. W. Daniel for improvements in the local electric plant to cost about $10,000.

Brooksville, Miss.—Town Council is arranging plans for extensions and improvements in the municipal electric light and water systems. J. N. McMorries is town clerk.

Crystal Springs, Miss. — City has authorized the issuance of bonds for $15,000, the proceeds to be used for improvements and extensions in the municipal electric-power plant.

Admiral, Tex.—McEwen Manufacturing Co. is having plans prepared for the construction of a new electric power plant. The structure is estimated to cost about $18,000.

Brownwood, Tex. — City is having plans prepared for the installation of a new municipal electric-light system. It is proposed to issue bonds for $150,000, the proceeds to be used for this work.

Caldwell, Tex. — Caldwell Electric Power & Ice Co. has filed notice with the Secretary of State of an increase in its capital from $10,000 to $40,000.

WESTERN STATES.

Dayton, Wash.—The Pacific Power & Light Co. has recently been awarded a contract for furnishing additional electric energy for the increased operation of the Dayton mill of the Portland Flouring Mills Co. It is said that the arrangements are being made to double the output of this plant during the coming summer, with accordant increase in power requirements.

Seattle, Wash. — City Council has approved plans for the construction of the proposed street railway extension

on East Marginal way, estimated to cost approximately $200,000. A double-track railway system will be constructed, commencing at Carleton avenue and East Marginal way, and extending on this latter thoroughfare to 1st avenue.

Vancouver, Wash.—Claassen Electric Co. is making rapid progress on the construction of a new 2-story brick addition to its plant.

Wenatchee, Wash. — Wenatchee Valley Gas & Electric Co. is making rapid progress on the construction of a new plant for its new steam generator station, to have a capacity of about 1000 hp. The structure is estimated to cost about $80,000, and it is planned to have the building ready for operation during the early part of April.

Emeryville, Cal.—American Rubber Co. is arranging plans to double the present capacity of its plant, and large quantities of electrical and mechanical equipment will be required. A. H. McLaren is engineer for the company.

Fresno, Cal.—San Joaquin Light & Power Corp. has preliminary plans under way for the construction of a new 6-story administration building, about 80 by 100 ft.

Long Beach, Cal. — Baty-Graham Electric Co. has filed notice of organization to operate at 221 East Broadway, for the manufacture of electric goods. C. W. Graham, R. S. Baty, and E. E. Baty, 643 West 4th street, all of Long Beach, head the company.

Los Angeles, Cal.—City officials are having plans prepared for the installation of a new electric street-lighting system, ornamental type, in 7th street, San Pedro district, between Beacon street and Pacific avenue.

Los Angeles, Cal.—Sespe Light & Power Co. has filed application with the State Water Commission for permission to utilize a total of 60,000 acre feet of water from Piru creek, Ventury county, per annum, for power purposes.

Oakland, Cal.—Western Power Co. is making rapid progress on the construction of a new power line extending from the plant of the American Manganese Co. to the Parr Terminal district. The new line will be utilized for the furnishing of electric energy for the new wharves and warehouses now in course of construction by R. W. Littlefield.

San Bernardino, Cal.—City has had plans prepared for the installation of a new ornamental electric street-lighting system on East 4th street, to extend from Pein to Alamitos avenues.

San Mateo, Cal.—City Trustees are considering plans for the immediate installation of a new electrolier street-lighting system throughout the municipality. E. W. Foster is city clerk.

Tulare, Cal.—Considerable electrical equipment, it is understood, will be required in connection with the construction of the proposed new laundry plant of the Tulare Model Laundry, operated by J. M. Hooks on property recently acquired comprising five city lots at M. and Kern streets.

Westwood, Cal.—Red River Lumber Co. is arranging plans for construction of a new hydroelectric power plant, to be located on Clear Creek, a dam to be constructed across the Feather River. It is proposed to develop a total of about 5000 hp., to be utilized by the company for the operation of its local sawmills.

INCORPORATIONS

Anderson, Ind.—The Anderson Machine and Tool Co. has been incorporated with capital of $150,000, with Henry P. Hardie, William H. Bozell, Paul A. Goldsmith, William Estep, and Noble Sherwood as directors.

Indianapolis, Ind.—American Bearing and Die Casting Corp. has been incorporated with capital of $500,000 for the manufacture of die castings by Lawrence Olson, Frank Fitzgibbon, Q. R. Jenkins and others.

Columbia City, Ind.—The Columbia Safety Appliance Co. has been incorporated with capital of $35,000 by Thomas L. Hildebrand, Ernest Cotterly and John W. Adams.

Brooklyn, N. Y. — Auto-Automatic Signal Co. Capital, $40,000. To manufacture electric signalling apparatus. Incorporators: R. A. and G. Gnam, and C. F. Marston, 2230 Tilden ave., Brooklyn.

New York, N. Y.—Lens Apparatus Co. Capital, $40,000. To manufacture electro-surgical apparatus. Incorporators: L. H. Miller, N. H. Burofsky, and A. G. Mayer, 517 West 136th street.

New York, N. Y. — Skinderviken Electrical Co. Capital, $35,000. To manufacture telephone and telegraph equipment. Incorporators: H. E. Goldsmith, J. Skinderviken, and M. Moskowitz, 1265 Broadway.

New York, N. Y.—Telephone Co. Capital, $25,000. To manufacture telephone accessories. Incorporators: W. F. Wagner, E. M. Hein, and C. Joseph,, 198 Bay 17th street, Brooklyn.

Brooklyn, N. Y. — Public Service Gas & Electric Illuminating Corp. Capital, $6000. To manufacture electric lighting fixtures, etc. Incorporators: S. Levine, J. Trow, and A. Galinko, 441 Ashford street.

Syracuse, N. Y. — Latta's Electric Station. Capital, $100,000. To manufacture electric batteries, etc. Incorporators: R. E. Wight, C. E. Kreuzer, and G. Latta.

Newark, N. J.—Beller Electric Supply Co., 800 Broad street. Capital, $100,000. To manufacture electric supplies, etc. A. Cohen and R. and B. H. Beller, Trenton are the incorporators.

Paterson, N. J. — Riverside Engineering Co. Capital, $50,000. To manufacture electrical goods. Incorporators: George W. Kent, J. Galoppa, and George R. Decnyf.

Dover, Del.—Kennessee Power Co. Capital, $25,000. To construct and operate an electric power plant. Incorporators: M. C. Kelly, M. L. Horton, and S. L. Mackey, Wilmington.

Baltimore, Md.—Radio Engineering Co., 827 Madison avenue. Capital, $25,000. To manufacture wireless apparatus, electrical goods, etc. Incorporators: Edward B. Duvall, Charles E. King, and Peter Peck.

Crowder, Okla.—Crowder Light Co. Capital, $5000. To operate a local light and power plant. A. Boiles is secretary and manager.

Citronelle, Ala.—Citronelle Light & Power Co. Capital, $10,000. To operate a local electric light and power plant. Incorporators. John A. Burt, A. G. Woodbury, and J. S. Lynch.

Huntington, W. Va.—Electric Service Co. Capital, $25,000. To engage in a general electrical contracting capacity. Incorporators: George L. Forest, Earsel, W. Va.; Gordon L. Hawes, and James L. Dillon, both of Huntington.

Charleston, W. Va. — Mountain State Electric Co. Capital, $100,000. To operate a local electric light and power plant. Incorporators: R. S. White, H. R. Sapp, and Fred O. Blue.

Fort Worth, Tex.—Southern Electric Co. Capital, $10,000. To manufacture electrical goods, etc. Incorporators: R. H. Minn, G. W. Ashford, and J. R. Cutler.

Marion, O.—Marion Electric Sales Co. has incorporated with capital stock of $25,000. J. H. Maish, F. A. Huber, D. L. Lamarche, C. F. Lamarche, and J. B. Hume are the incorporators.

FOREIGN TRADE

[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]

Electrical Machinery (31,943) — A firm in Norway desires to purchase automobiles and bicycles and their accessories, electrical apparatus and supplies, rubber, rubber goods, agricultural implements and supplies, trucks, tractors, motorcycles and accessories and motors. Quotations c. i. f. Norwegian port. Payment through banks in Norway and in New York. References.

Electric Light Installations (31,926) —A commercial agent in the Levant desires to enter into communication with American firms for the importation of materials and furnishings for technical and agricultural enterprises of every kind, particularly electric light installations, tramways, workings of mines, construction of irrigation systems and erection of warehouses and other buildings in reinforced concrete. References.

Electric Appliances (31,931) — A merchant in France desires to purchase electric appliances. Quotations should be made c. i. f. French port. Payment, cash. Correspondence may be in English. Reference.

Which Man—Which Party?

"It must be a party of a future, as well as of a past. Of prospective performance, as well as of history and reminiscence; not merely a party of negation or of opposition, but of construction and of hope; that will set the bow of promise in the political sky and make the promise good.

"Due reverence for the past is a good part of secure national anchorage. It tends to a proper conservatism, and in due conservatism there is safety. But the glories of the past must not be suffered to impose undue limitations upon the future.

"Ever mindful of great examples and high precepts which come to us from those whose memories we cherish, treading whenever we may that surer pathway which is lighted by the lamp of experience, in the mighty march of progress we must ofttimes blaze new ways through tangled, pathless jungles of inexperience and doubt."

This is not the place for political discussion. Nevertheless, every man of the electrical industries has a vital interest in determining the issues of the coming presidential campaign, and I believe that the words quoted above are worth calling attention to at the present time.

They are not a part of the debate on the peace treaty; they were not called forth by any industrial question of today. They were spoken nearly twenty years ago by a man still prominent in American life. What is his name? To what party was he referring? Ten to one you will guess wrong in both cases; but that doesn't matter. The doctrine is good; its application is plain. Whatever your party, whatever your convictions, you cannot afford, as a business man, to let your influence remain unfelt. Before Chicago, before San Francisco, comes your individual duty as a citizen. Will it be on the side of construction of progress, or mired in the slough of indifference and negation? That is for you, alone to decide.

C. A. TUPPER, President
INTERNATIONAL TRADE PRESS, INC., Chicago

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

No Change in Business Conditions Since Jan. 1.

There are no changes in the basic elements which have determined the business situation since the beginning of the year. Production is still far behind the demand for goods of all sorts, especially those which appear to indicate recently acquired purchasing power, as the best grades of clothing and shoes, ornate furniture, silks, jewelry, automobiles, etc. The demand for some of these, as for example, automobiles, has driven prices for other commodities, for example, iron, to new high levels. The supply of labor is far short of the demand, and from all sections of the country come reports that with increases of wages and shortening of hours the production of goods has fallen off. Appreciation of the fact that increased wages are a futile cure for the high cost of living when there is underproduction, gains headway but slowly. Wholesale buying is on a large scale, with indications, however, of more careful study of the future. The return of the railroads to private control is generally regarded as a stabilizing influence upon the uncertainties of the transition period. There are prospects for a real building boom as soon as the rigors of winter end, but all builders are handicapped by the scarcity of materials and the high cost of skilled labor.

Greenfield Tap & Die Stock Offered.

Tucker, Anthony Co., Boston and New York, are offering 20,000 shares common stock of the Greenfield Tap & Die Corp. at $51 per share to yield about 8%. Corporation owns and operates eight factories in Greenfield, Conn., and a Canadian plant at Galt, Ontario, employing about 2,000 people. It is capitalized for $1,500,000 6% preferred and $2,000,000 common, par value $25. Replacement value is estimated at $9,000,000 to $10,000,000, including the cash and bills receivable. The dividend record extends over a long period of years. Gross sales have increased from about $1,000,000 in 1912, when the company was organized, to approximately $5,000,000 in 1919. Orders received for the first two months of 1920 are the largest in its history.

Pacific Gas & Electric Co.

Preliminary income account of Pacific Gas & Electric Co. for the fiscal year ended December 31, 1919, makes a favorable comparison with that of the previous year. Gross earnings for 1919 amounted to $26,582,687, compared with $22,595,516, an increase of $3,476,969. Net earnings last year after taxes, maintenance and depreciation amounted to $8,833,560, compared with $8,375,388. Surplus after preferred dividends and applicable to the $3,340,353 common stock amounted to $1,809,330, compared with $1,580,840. The company at the close of the year was in exceptionally strong cash position. It had in its treasury in cash $2,027,000 and approximately $750,000 U. S. Government bonds. It had no floating debt or short term obligations outstanding except an issue of $240,000 unmatured notes assumed in connection with the acquisition of the Northern California Power Co. properties. Officials of the company now have an application before the Railroad Commission for further increases in gas and electric rates.

Metropolitan Edison Co.

Earnings of the Metropolitan Edison Co. and the Pennsylvania Utilities Co. for the 12 months ended January 31, 1920, compare with corresponding time in 1919 as follows:

	1920.	1919.
Gross	$4,115,422	$3,679,474
Net after taxes	1,427,747	1,070,208

Gilbert Co. Offers Stock Issue.

A. C. Gilbert Co., New Haven, Conn., manufacturer of electrically operated toys, small electric fans, motors, etc., has arranged for the issuance of stock for $400,000, the proceeds to be utilized to provide additional working capital, as well as for general business expansion. The company was organized in 1910, at which time it specialized in the production of educational toys, this being later extended to include wireless sets and other electrically operated novelties.

Northern Ohio Electric Corp.

Earnings of the Northern Ohio Electric Corp., for the month of January and the twelve months ended January 31, 1920, compare with 1919 as follows:

	1920.	1919.
January gross	$ 882,012	$ 696,193
Net after taxes	134,625	62,183
Bal. after pfd. divs.	104,625	32,183
12 months' gross	9,483,718	7,441,612
Net after taxes	1,169,122	734,311
Bal. after pfd. divs.	809,122	374,311

Northern Texas Electric Co.

Earnings of the Northern Texas Electric Co. for January and the 12 months ended January 31, 1920, compare with 1919 as follows:

	1920.	1919.
January gross	$ 310,002	$ 244,490
Net earnings	118,157	92,300
Surplus after charges	93,292	67,257
12 months' gross	3,453,367	2,923,938
Net earnings	1,378,794	1,142,824
Surplus after charges	1,079,539	841,266

Colorado Power Co. has declared its regular quarterly dividend of 1¾% on the preferred stock, payable March 15 to stockholders of record Feb. 28.

Mississippi River Power Co.

Earnings of the Mississippi River Power Co., for January and the 12 months ended January 31, 1920, compare with 1919 as follows:

	1920.	1919.
January gross	$ 205,677	$ 181,139
Net earnings	158,173	135,147
Surplus after charges	56,478	31,494
12 months' gross	2,346,492	2,232,869
Net earnings	1,822,350	1,783,679
Surplus after charges	593,574	534,059

Columbus Electric Co.

Earnings of the Columbus (O.) Electric Co. for January and the 12 months ended January 31, 1920, compare with 1919 as follows:

	1920.	1919.
January gross	$ 141,805	$ 121,785
Net earnings	55,511	62,778
Surplus after charges	24,906	32,341
12 months' gross	1,329,301	1,194,220
Net earnings	604,788	609,505
Surplus after charges	238,290	265,152

Dividends.

Allis-Chalmers Manufacturing Co. has declared its regular quarterly dividend of 1¾% on the preferred stock, payable April 15 to stockholders of record March 31.

Buffalo General Electric Co. has declared its regular quarterly dividend of 2%, payable March 31 to stockholders of record March 20.

Detroit Edison Co. has declared its regular 2% quarterly dividend, payable April 1 to stockholders of record March 1.

Electric Storage Battery Co. has declared its regular quarterly dividend of 2½% on the common stock and a similar dividend on the preferred stock, both payable April 1 to stockholders of record March 15.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities.	Div. rate. Per cent.	Bid Mar. 2.	Bid Mar. 9.
Adirondack Electric Power of Glens Falls, common	6	11	12
Adirondack Electric Power of Glens Falls, preferred	6	76	77
American Gas & Electric of New York, common	10+extra	120	119
American Gas & Electric of New York, preferred	6	38	38
American Light & Traction of New York, common	..	183	180
American Light & Traction of New York, preferred	6	88	88
American Power & Light of New York, common	4	57	58
American Power & Light of New York, preferred	6	68	69
American Public Utilities of Grand Rapids, common	..	3	3
American Public Utilities of Grand Rapids, preferred	7	18	20
American Telephone & Telegraph of New York	..	97⅜	99
American Water Works & Elec. of New York, common	..	2	2
American Water Works & Elec. of New York, particip	7	7	4
American Water Works & Elec. of New York, first preferred	..	46	47
Appalachian Power, common	..	1	2
Appalachian Power, preferred	7	19	20
Cities Service of New York, common	+extra	362	390
Cities Service of New York, preferred	6	69	71
Commonwealth Edison of Chicago	8	106¼	106¼
Comm. Power, Railway & Light of Jackson, common	..	18	18
Comm. Power, Railway & Light of Jackson, preferred	6	37½	37½
Federal Light & Traction of New York, common	..	6	5
Federal Light & Traction of New York, preferred	..	43	42
Middle West Utilities of Chicago, common	..	18	18
Middle West Utilities of Chicago, preferred	..	38	38
Northern States Power of Chicago, common	..	55	45
Northern States Power of Chicago, preferred	ex.div.7	85	83
Pacific Gas & Electric of San Francisco, common	..	44½	45
Public Service of Northern Illinois, Chicago, common	7	74	74
Public Service of Northern Illinois, Chicago, preferred	6	85	85
Republic Railway & Light of Youngstown, common	4	13	13
Republic Railway & Light of Youngstown, preferred	6	47	47
Standard Gas & Electric of Chicago, common	..	17	17½
Standard Gas & Electric of Chicago, preferred	6	38	38½
Tennessee Railway, Light & Power of Chattanooga, common	..	1	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	7	7
United Light & Railways of Grand Rapids, common	4	25	25
United Light & Railways of Grand Rapids, preferred	6	60	61½
Western Power of San Francisco, common	..	18	17
Western Union Telegraph of New York	extra	83	85⅛
Industries.			
Electric Storage of Philadelphia, common	4	110	110
General Electric of Schenectady	8	156	168
Westinghouse Electric & Mfg. of Pittsburgh, common	7	50½	52